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Empirical Studies of Micro-level Data
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ECONOMIC AND CULTURAL DEVELOPMENT: EMPIRICAL STUDIES OF MICRO-LEVEL DATA

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Lena Lindbjerg Sperling

ECONOMIC AND CULTURAL DEVELOPMENT

EMPIRICAL STUDIES OF MICRO-LEVEL DATA

PhD School in Economics and Management

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CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

Economic and Cultural Development:

Empirical Studies of Micro-level Data

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PhD School in Economics and Management

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The PhD School in Economics and Management is an active national
and international research environment at CBS for research degree students who
deal with economics and management at business, industry and country level in a
theoretical and empirical manner.

Acknowledgments

Summary

What affects the economic and cultural development tracks of societies? We know that large events such as political changes, natural disasters and migration can change a society dramatically at the macro level, but what exactly happens at the individual level? When conditions change, people are likely to change accordingly both in terms of economic behavior and cultural values. In this PhD dissertation I explore the underlying developments that occur due to large scale events. The method involves empirical analysis of micro-level cross-sectional data using a rich set of survey data, where the settings progress from state, to country, to the entire world. When looking at individuals within a country, it is possible to tease out the causal effect of an event affecting only a share of the individuals who are likely to have otherwise experienced unchanged behavior. My dissertation consists of three separate articles, each exploring distinct matters but using similar methodological frameworks and econometric techniques. The first two chapters aim to determine the causal effect of an event. In the third chapter, we instead describe developments at the global level, adding to knowledge on recent cultural changes. Below, I briefly introduce each paper.

The first chapter titled "Flooded jobs: Income development after the 2007 Tabasco flood," shows how labor income is affected by a large natural disaster with significant destruction of infrastructure and agricultural production. I study the effects of the flood hitting the Mexican state of Tabasco in late 2007, which caused damages of around three billion USD amounting to one third of the state GDP. I examine the distributional patterns and the underlying mechanisms of the effects using a quarterly repeated cross-sectional labor survey data set. I find a large and significant negative effect on the labor income for the affected population. The effect is mainly driven by an increase in the share of the population, predominantly males, earning nothing or below the minimum wage. The increase in zero-income earners is driven by people still working, which is possible in an economy with a high degree of informality and self-employment. The negative effect is larger for workers in the agricultural sector, although I find no changes in the sectoral composition. This means

that workers, and households, were not able to mitigate the lower income by changing their labor supply. The increase in people earning zero income was more persistent than the effect on strictly positive wages, meaning that it is important to include these when estimating the full cost of lost labor income in the aftermath of a disaster. I also find no decrease in the intensity of night lights, indicating that the flood did not cause a decline in activity, but rather a decline in the return to labor.

In the second chapter "Politics and Religion: Effects of the Faith-Based Initiatives in the US 1996-2010" we examine whether policy affects religious behavior and beliefs. We study the implementation of the faith-based initiatives across the US reducing government regulations of faith-based organizations and increasing their access to public funds. We use the variations in timing of the implementation of the initiatives across states to find the causal effect of closer ties between government and religious organizations on attendance levels, religiosity levels, and additional outcomes such as unemployment and happiness. We find that the implementation of a faith-based initiative increased both church attendance and religious beliefs significantly. The change in cooperation between government and religious organizations most directly affected lower-income individuals, and we do also find stronger results for this group. Religious beliefs, however, increased for all income groups, indicating that the faith-based initiatives brought with them more than a changed provision of welfare. The majority of the initiatives did not involve much funding, but rather a change in political practices tying religious organizations closer to government. We find effects of equal size regardless of which type of law was implemented, indicating that symbolic laws had the same effect as concrete monetary laws. Additionally, we find an increase in non-profit organizations and congregations as a response to the laws. Proceeding to assess whether the initiatives improved outcomes of the public programs, we analyze the effect on feelings of life satisfaction, drug- or alcohol-induced deaths, crime rates, poverty levels, education, income, and employment rates. We find borderline increases in the likelihood of being employed, but also of being unhappy. We find no effects on the remaining measures of well-being.

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The third chapter, "Global Values: Developments in Cultural Inequality" evaluates global inequality in terms of cultural values. With rising inequality levels with regards to income, we set out to explore whether the same has occurred for cultural values, or if increasing globalization has led to a global convergence in values. Using the pooled World Values Survey and European Values Study, we examine the distribution of attitudes regarding which qualities are important to teach children for the cohorts born between 1920 and 1990. We find that while the share of the world population valuing hard work and independence has been increasing, cross-country inequality in the two values have decreased and been stable respectively. The mean valuing of the more traditional value of religious faith did not change over the period of analysis, but the cross-country inequality has increased significantly. With a stable global inequality, this means that a larger share of the total inequality can be explained by cross-country differences rather than within-country differences. The underlying factors behind this development have been increasing numbers of Hindus and Muslims with high levels of religiosity. At the other end of the scale, the share of nonreligious people also increased, leading to a higher degree of polarization in religiosity across countries, especially within South East Asia which contains both non-religious nations such as China and highly religious nations such as Indonesia, the Philippines, and India.

Resumé (Summary in Danish)

Hvad ændrer hvor et land er på vej hen, økonomisk og kulturelt? Vi ved at store begivenheder som politiske beslutninger, naturkatastrofer og migration kan ændre et samfund dramatisk på makro niveau. Men hvad sker der præcist nede på individ niveauet? Når betingelserne ændrer sig er det sandsynligt at befolkningen ændrer sig, både med hensyn til økonomisk adfærd og kulturelle værdier. I denne PhD afhandling undersøger jeg de underliggende ændringer når store begivenheder sker. Min metode omfatter empirisk analyse af et rigt sæt af surveydata på individ niveau, hvor scenen ændrer sig fra en stat, til et land og til hele verden. Når jeg kigger på individer indenfor et land er det muligt at isolere den kausale effekt af en begivenhed på de påvirkede individer, der ellers kan antages at have opført sig som deres upåvirkede landsmænd. Min afhandling består af tre separate artikler, der hver undersøger forskellige emner, men med ligheder i de metodologiske rammer og økonometriske teknikker. Formålet med de to første kapitler er, at finde den kausale effekt af en begivenhed. I det tredje kapitel beskriver vi i stedet udviklingen på det globale niveau for at øge vores viden om nylige kulturelle ændringer. Nedenfor vil jeg kort introducere hvert papir.

Det første kapitel med titlen "Flooded jobs: Income development after the 2007 Tabasco flood" viser hvordan arbejdsindkomsten påvirkes af en enorm naturkatastrofe med store ødelæggelser af infrastruktur og landbrugsproduktionen til følge. Jeg undersøger effekterne af en oversvømmelse, der ramte den Mexicanske stat Tabasco i 2007 og forårsagede ødelæggelser for omkring tre milliarder USD, svarende til en tredjedel af statens BNP. Jeg analyserer de fordelingsmæssige aspekter og underliggende mekanismer ved brug af et kvartalsvist indsamlet repræsentativt datasæt med arbejdsmarkedsinformation. Jeg finder en signifikant negativ effekt på arbejdsindkomsten for den påvirkede befolkning. Effekten skyldes hovedsagligt en stigning i andelen af befolkningen, primært mænd, uden arbejdsindkomst eller med et afkast på arbejde under minimumslønnen. Stigningen i andelen uden indkomst er drevet af folk der stadig arbejder, hvilket er muligt i en økonomi med en stor

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uformel sektor og mange selvstændige. Den negative effekt er større for arbejdere i land-brugssektoren, omend jeg ingen effekt finder på fordelingen af arbejdskraft på tværs af sektorer. Det indikerer at arbejderne, og husholdningerne, ikke er istand til at afbøde den lavere indkomst ved at ændre deres arbejdsudbud. Stigningen i antallet af personer uden en positiv arbejdsindkomst er mere persistent end effekten på lønniveauet, hvilket viser at det er vigtigt at inkludere denne stigning ved estimationer af den tabte arbejdsindkomst efter en naturkatastrofe. Jeg finder ingen effekt på mængden af lys om natten, hvilket indikerer at der ingen effekt var på aktivitetsniveauet, men udelukkende en reduktion i afkastet på arbejde.

I andet kapitel "Politics and Religion: Effects of the Faith-Based Initiatives in the US 1996-2010" undersøger vi om politik påvirker religiøs adfærd og tro. Vi analyserer imple-menteringen af faith-based initiativerne i USA, der reducerede reguleringen af trosbaserede organisationer og øgede deres adgang til offentlige midler. Vi bruger variationen i imple-mentering af initiativerne over tid på tværs af amerikanske stater til at finde den kausale effekt af det styrkede bånd mellem stat og religion på hvor ofte folk går i kirke, hvor re-ligiøse de er og andre mål såsom arbejdsløshed og lykke. Vi finder at implementeringen af faith-based initiativer øgede både kirkedeltagelse og religiøs tro signifikant. Ændringen i samarbejde mellem regeringen og religiøse organisationer påvirkede mest direkte dem med de laveste indkomster, og det er også for denne gruppe vi finder de stærkeste effekter. Re-ligiøs tro steg dog for alle indkomstgrupper, hvilket indikerer at initiativerne medførte mere end bare ændret levering af velfærdsydelser. Majoriteten af initiativerne inkluderede ikke øgede pengemængder, men snarere en ændring i den politiske praksis som knyttede de re-ligiøse organisationer tættere til de offentlige. Vi finder effekter i samme størrelsesorden på tværs af typen af lovene, hvilket indikerer at symbolske love havde samme effekt som mere konkrete love med øget finansiering. Vi finder yderligere en stigning i antallet af non-profit organisationer og menigheder som svar på lovene. Vi fortsætter med at analysere hvorvidt initiativerne forbedrede resultaterne af offentlige programmer ved at undersøge effekten på

lykke, dødsfald som følge af narkotika eller alkohol, mængden af voldelige forbrydelser, fattigdom, uddannelse, indkomst og arbejdsløshed. Vi finder et fald i sandsynligheden for at være arbejdsløs, men også et fald i lykke og ingen effekter på de andre velfærdsmål.

Det tredje kapitel "Global Values: Developments in Cultural Inequality" evaluerer global ulighed i kulturelle værdier. De seneste årtiers økonomiske udvikling har medført voksende global ulighed og vi undersøger om det samme har været tilfældet for kulturelle værdier, eller om den øgede globalisering modsat har medført konvergens i værdier. Vi bruger det samlede World Value Survey og European Values Study til at undersøge fordelingen i holdninger omkring hvilke kvaliteter børn bør lære. Vores analyse spreder sig over kohorter født mellem 1920 og 1990. Vi finder at mens andelen af personer i verden, der værdsætter hårdt arbejde og uafhængighed har været stigende, har uligheden på tværs af lande været henholdsvis faldende og konstant for disse værdier. For mere traditionelle værdier, som religiøsitet, har niveauet været relativt konstant over perioden, mens uligheden på tværs af lande har været markant stigende. Med en stabil global ulighed betyder dette at en større del af den globale ulighed kan forklares af forskelle på tværs af lande sammenlignet med forskelle indenfor lande. De underliggende faktorer bag denne udvikling er et stigende antal hinduer og muslimer med høje religiøsitetsniveau. I den modsatte ende af skalaen er der kommet flere ikke-religiøse, hvilket har bidraget til den øgede polarisering på tværs af lande. Regionalt set er den største polarisering sket i Sydøstasien, der består både af ikke-religiøse nationer som Kina og stærkt-religiøse som Indonesien, Filippinerne og Indien.

Contents

Chapter 1

Flooded Jobs:

Income Development after the 2007 Tabasco Flood

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Flooded Jobs:

Income Development after the 2007 Tabasco Flood

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Abstract

Natural disasters are becoming more frequent events that affect an increasing share of the world population each year. In this paper I examine the economic effects of the 2007 flood in Tabasco, Mexico. I demonstrate that the flood caused an immediate decline in work income for the affected population. This result is mainly driven by an increase in the number of, predominantly male, workers that continue to work after the flood but now earn no or less than the minimum wage. The agricultural sector experienced the most severe income decline, although I find no changes in sectoral composition. Using night light as a proxy for economic activity I find no effects of the flood, which indicates that returns rather than activity levels were affected.

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1 Introduction

When a disaster hits, there are large, immediate effects on the surrounding area. Livelihoods are destroyed, physical capital is reduced and lives are possibly lost. The incidence of natural disasters has increased rapidly over the past 30 years, mainly due to increased rates of urbanization, deforestation, environmental degradation and climate change (Borja-Vega & De la Fuente (2013) and Leaning & Guha-Sapir (2014)). There is a broad consensus that developing countries are most affected by the increasing amount and severity of the disasters, due to both their geographical situations and lower resilience (Stern, 2007). Floods are among the costliest and most frequent disasters worldwide (Kocornik-Mina et al., 2015). With the expected increase in frequency and intensity of natural disasters (IPCC, 2014), the importance of understanding the full cost and effects also increases. The main part of the indirect costs of a natural disaster is the foregone labor income of the affected population. However little is known about the size of this lost labor income, and the distributional pattern of the effects (Haer et al., 2017).

The objective of this paper is to improve our understanding of the lost income following a major natural disaster. I study the effects of the flood hitting the Mexican state of Tabasco in late 2007 which caused damages of around three billion USD, amounting to one third of the state GDP (World Bank, 2014). The disaster has been characterized as extraordinary and largely unpredictable (CEPAL, 2011). Specifically I combine spatial data on the extent of the flood with the National Survey of Occupation and Employment (*Encuesta Nacional de Ocupación y Empleo*, ENOE) sampled every quarter since the first quarter of 2005 and with a low level geographical identifier. The combination of the quarterly sampled survey data and the spatial data on the extent of the flood makes it possible to analyze the effect both across time and space. I am able to tease out the effects across the state relative to the distance to the flood border. This provides important information about where the aid after a disaster should be directed and differences across extensive (being inside or outside the flooded area) and intensive (across distance to the flooded border) margins. Additionally I follow the effect across time to reveal when the income level of the affected area was no longer significantly different from the rest. The survey data provides detailed information on labor market characteristics of the entire population between ages 12 and 97 years, allowing the possibility to look at the distributional effects of the disaster in terms of labor market participation and the return to

labor.

My main results point towards sizable negative effects on the work income in the immediate aftermath of the flood. Being within the flooded area decreased income by 3.3 percentage points, amounting to 15.7 percent of the average income. The effect was smaller on the intensive margin with a 100 percent increase in the distance from the localities deepest within the flooded area, resulting in 2.2 percentage point higher incomes. The effect on work incomes decreased after a two-year period for the distance measure of treatment but prevailed for the entire five-year period for the binary measure. This indicates that the persistence of effects was stronger on the extensive margin than on the intensive. The main mechanism behind the income decline was an increase in the share of the population with zero or below minimum wage work income. While the effect on those earning a strictly positive income was gone after a year, the increase in those earning zero or less than the minimum wage was more persistent. The results are robust to using other measures of income, additional controls, spatial correlation, and locality and time fixed effects. There are no indications of pre-trend differences driving the results.

The results may be driven by in- and out-migration of different types of people after the flood, changing the composition of workers. There are no signs of changing population size relative to the flood border, and no changes in the demographic variables age and marital status. A small decline in the number of males indicates the possibility of men migrating to find better employment possibilities elsewhere. Without any effects on the other demographic measures out-migration is not likely to explain the results.

The flood was found to destroy a large number of jobs in the affected areas leading to a lower demand for labor, particularly in the agricultural sector. In coherence with this I find larger negative income effects in the agricultural sector, whereas there are indications of positive effects on the incomes in the service sector. Despite changed returns to labor across sectors I find no changes in the sectoral composition as a response, indicating a low level of labor mobility. The mechanism behind the lower income seems to mainly be a decrease in the return to labor, pushing the work income below the minimum wage. I find no effect on the risk of being unemployed, but an increase in the share working without receiving any pay. This is partly possible due to the large share of the population working informally and thereby without any labor rights or protection. I find no effects on participation in the labor force, although a borderline significant increase in enrollment rates and in the share receiving

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economic support are found. The effect was stronger for males, whereas I find no heterogeneous effects across educational attainment. Additionally I find even stronger negative effects on the household income with a decreased variance of income within the household and increased shares of households with no income. These results point towards few mitigating actions taken to accommodate the lower return to labor. An alternative measure for economic activity is the night light intensity. In an additional analysis looking at the effect on night light I find no significant effects of the flood supporting that there was no decrease in activity, but rather only in the return to labor.

The paper is organized as follows; the existing literature is in section 2, followed by details on the state of Tabasco and the flood in section 3. In section 4 I present the theoretical considerations behind the empirical analysis. Section 5 describes the data and section 6 the empirical framework. In section 7 I present the empirical results. Section 8 includes additional validations of the results and section 9 discusses and concludes the findings.

2   Economic effects of natural disasters

The literature on the economic effects of disasters is growing as the prevalence of natural disasters increases (IPCC, 2014). A bulk of the literature has focused on the aggregated economic effects in either the short or the long term, see Dell et al. (2014) for a comprehensive review. The macro-economic literature is, however, inconclusive regarding the effect on the GDP growth rates 5 years or longer after the event (Simonsen, 2012). The inconclusiveness calls for more detailed analyses at the micro level in order to understand the underlying mechanisms of the effects. The micro-economic literature analyzing how households or small societies are affected is less comprehensive (Anttila-Hughes & Hsiang, 2013). The purpose of this section is to present the state of the literature and how this article contributes.

Kocornik-Mina et al. (2015) analyze the effect of flood risk across cities globally and find that there is an immediate decline in economic activity measured by night light after a major flood, but that economic activity recovers the subsequent year. In a time frame of four years after the flood they do not see any significant effects. These results are supported by the results found in this paper, namely that there are limited effects of major floods on economic activity. Another study of urban areas is Rodríguez-Oreggia (2013), estimating the effects of hurricanes on urban

labor markets in Mexico. Using the quarterly employment and income data, also used in this study, he looked at the changes in work income in the aftermath of hurricanes across the country. Like the bulk of the literature on the short-term effects Rodríguez-Oreggia only looked at two time-periods; before the disaster and after the disaster. Also looking at work income, he found that hurricanes increase urban wages especially for low-educated workers, supporting that there is a higher demand for construction workers due to rebuilding efforts after a disaster. In this paper I look at the entire population of the state and find no positive effects on the construction sector or heterogeneous effects across educational level. Cameron & Worswick (2003) have also analyzed the short-term labor market effects of a negative income shock. Looking at crop loss in Indonesia using one cross-sectional survey, they found that rural households cope with the loss by increasing their labor supply and seeking more productive employment in other sectors. This supports the notion that a natural disaster may be productivity enhancing at the local level, conditional on more productive activities being available to the affected workers, which does not seem to be the case in Tabasco after the flood. Mueller & Quisumbing (2009) have analyzed the effects of the 1998 flood of the century in Bangladesh after five years. Looking at survey data immediately after the flood and again five years later, they found no immediate effects on real wages in the casual labor markets, probably due to relief programs, but did find significant negative effects in the long run. These results are supported in this study where I find larger negative effects on income at the end of the period of analysis for those within the flooded area. Mueller & Osgood (2009) looked specifically at the rural workers in Brazil after a drought, and found that it took five years for the affected rural workers to catch up with the unaffected. Additionally they found that dependence on agriculture has a significant negative effect. The opposite results are found in Kirchberger (2017), evaluating the effect of an earthquake in Indonesia on the local labor market. With different measures of intensity of the shock, Kirchberger identified an increase in monthly wages driven by the agricultural sector. While her paper evaluated similar outcomes as the research here, and focused on the labor market responses, our papers are different in several dimensions. First there is the nature of the disaster; whereas the earthquake destroyed houses and resulted in the deaths of thousands, the flood also destroyed agricultural output leading to a large decline in jobs. In addition to the different natures of the disasters, my use of quarterly sampled data over a long period makes it possible to follow the dynamics of the responses and the underlying mechanisms behind the

change in labor income.

In addition to the wage effects are the investment effects found by among others, Anttila-Hughes & Hsiang (2013). In their study of household expenditure in the aftermath of a typhoon in the Philippines they found that expenditures, especially related to human capital investments, are reduced almost one-to-one with the income loss resulting from the typhoon. This may suggest that if the direct income effects are severe, the indirect effects on more long-term characteristics may also be affected. I test whether this is also the case in this setting by looking at the effect on enrollment rates. I find, on the contrary, that enrollment rates are marginally positively affected by the flood due to the lack of productive employment enrollment, indicating that the outside option of education has decreased.

An important alternative outcome of a disaster possibly having more permanent effects is migration. Hornbeck & Naidu (2014) analyzed black population migration patterns and subsequent capitalization of agriculture in the aftermath of the Mississippi flood in 1927. They found that the flooded counties experienced a significant out-migration of black population after the flood, leading to increased capitalization and thereby long-term higher productivity compared to unaffected counties. These results are in line with the macro literature on positive effects of natural disasters advocated by, among others, Skidmore & Toya (2002). Migration after disasters was also analyzed at the global level by Beine & Parsons (2015). Looking at the period from 1960 to 2000 they found that internal urban migration is significantly affected by natural disasters, thus supporting that a negative immediate shock to agricultural wages can have long term effects due to migration to urban areas. Structural changes like these are not found in this paper but support the results by another historical paper which tried to settle whether a flood has permanent or only short-term effects. Husby et al. (2014) looked at the population size effects of a severe flood in the Netherlands in 1953 and found that in the short term there was a drop in the population in the affected areas, but that it disappeared over time. The effects of the following governmental program to rebuild and protect the area had a larger and longer effect than the temporary flood shock. Out migration results are also found by Boustan et al. (2017) looking at counties across the United States, where out-migration is positively affected by non-place-based public transfers. I find small indications of out migration of men, likely due to the lower local demand for labor decreasing wages. Additionally I find borderline significant effects on the share of the population receiving economic support.

3   The State of Tabasco and the 2007 Tabasco Flood

Tabasco is a small state situated on the Gulf-coast of Mexico. In 2007 it had two million inhabitants which represented about 2 percent of the Mexican population. The state is located between the Mexican states of Veracruz, Chiapas, Campeche and the country Guatemala, with the Gulf of Mexico to the north, as depicted in Figure 2. Its geographic features are plain, as 92.5 percent of the territory is less than 30 meters above sea level. With the two major rivers, Grijalva and Usumacinta, running through the state, it is highly vulnerable to floods. The agricultural sector dominates in terms of employment with 17 percent of the labor force working in this sector in 2012 (declining from 24 percent in 2005), although it only contributes about 2 percent of the state GDP (INEGI, 2018). The informal sector is huge in the state, with 68 percent of the workers being informally employed in 2012 (relatively constant throughout the period of analysis). Especially within the agricultural sector, 93 percent work informally, but also construction, manufacturing, retail and transport have rates of informality above 70 percent. Tabasco also continues to be one of the poorest states in Mexico with 57.1 percent of the population below the national poverty line in 2010 (CONEVAL, 2012). The four municipalities with the poorest populations are Jonuta, Tacotalpa, Centla and Humanguillo, where Centla and Jonuta were both badly affected by the flood, and Huimanguillo and Tacotalpa were not flooded at all.

The climate in the low-lying flat state is humid and the annual precipitation ranges from 2750 mm in the coastal zone up to 4000 mm in the foothills (Aparicio et al., 2009), which is one of the highest in the world and the highest in Mexico. The high levels of rainfall in the state result in tropical rainforests being the dominant ecosystem. The size of the rainforest has declined rapidly over the past years due to logging and slash and burn agriculture. The extreme flood, which hit the state in late October and early November 2007, was the worst flood in Mexico in over 50 years (Sayrols, 2007) and the largest in the history of Tabasco (Valentín López-Méndez & Fernández-Eguiarte, 2008). The hydro-geological conditions in the state are rocks, and as the upper soil layers are rapidly saturated infiltration of the water is impossible resulting in the majority of the precipitation running off at the surface of the ground (Haer et al., 2017). The amount and duration of the precipitation was the largest in the state in more than 50 years. The flood lasted until 15 December 2007, where the last water

was removed from the streets and the population returned. 2007 was a moderate La Niña year, meaning that the oceanic temperatures in the Eastern equatorial Pacific were colder than normal causing more hurricanes in the south of Mexico (Golden Gate Weather Services, 2016) and (Rodríguez-Cuevas, 2016). As pointed out by Aparicio et al. (2009), the warning system was not functioning properly and the extent of the flood therefore came as a shock to the people in the flooded areas. The flood affected more than one million people, but without the loss of any human life (Aparicio et al., 2009). According to the Mexican government the total damages amounted to three billion USD or 29 percent of the state GDP. Twenty-eight percent of the cost was due to destruction in the agricultural sector spread over crops, livestock, fisheries and forestry (FAO, 2015). The main crops produced in Tabasco are maize, rice, cacao, sugar cane and plantain. While the massive destruction of maize mainly affected food security in the state, it has been estimated that the destruction of sugar cane production alone caused around 27,000 jobs to be lost. The 2007 flood was just the beginning of more, though much smaller, floods over the next four years (Haer et al., 2017). The total damage of the 2008-2011 floods have been estimated at around two billion USD, meaning that each flood was one-sixth the severity of the 2007 flood. The immediate response to the 2007 flood was rapid, avoiding the spread of diseases and high death tolls (Grillo, 2017). The federal government ordered thousands of soldiers, marines, pilots and federal police to the state capital before the flood hit minimizing the damage. Eighty thousand persons were internally displaced in 543 camps (ProActNetwork, 2008). However, by January 2008 only one camp was still open. Additionally, the National Fund for Natural Disasters (FONDEN) allocated 650 million USD to reconstruct the damaged areas. The response and immediate rebuilding and aid work has been characterized as rapid and well-functioning (Hofliger et al., 2012), just as the following investments and rebuilding processes have been numerous. The direct use of the funds directed to the rebuilding was, however, not tracked, and the governor of Tabasco during the year of the flood, Andrés Granier, has since been arrested for corruption (reuters, 2013) and listed as one of the ten most corrupt Mexicans (Estevez, 2013). Andres Granier was governor from 2006-2012 and his successor discovered that 190 million USD was missing from state coffers (Estevez, 2013). This unfortunately means that budget figures for the rebuilding process are highly unreliable and probably much smaller than stated. Appendix Figure A.9 shows the development of state government spending over time across affected and unaffected municipalities relative to 2005. The two curves largely follow the

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same development indicating that there was no extra spending in more affected localities in the aftermath of the flood. The government spending in 2008 did increase compared to previous years, though similar increases are also observed in later years.

4   Theoretical considerations

The first part of the analysis of the causal effect of the flood on work income explain the severity of the flood. As around 800,000 people lost their homes and the crops in the flooded areas were destroyed (MexicanRedCross, 2010), negative effects are expected. The question is how long the shock prevailed and whether there were any mitigating actions taken to accommodate the shock. The purpose of this section is to outline the theoretical considerations behind the empirical analyses in the following sections. A large negative shock to the stock of physical capital, without a reduction in the stock of labor, will, all else equal, increase the marginal product of capital and the opposite for the now relatively more abundant factor of production; labor. A temporary response by the workers would be to increase the weekly work hours to compensate for the lower marginal product and keep total income stable. This would require a positive marginal productivity of the hours worked and that additional work was available. Additionally, it would have the adverse effect of further increasing the supply of labor. This adverse effect could be reduced by a temporary increase in the demand for low-skilled labor as found by Rodríguez-Oreggia (2013). It is also likely that there were responses at the household level including income diversification and intra-household reallocation of time with one member working at home rebuilding the assets of the household. These effects would result in a smaller effect at the household level and increased within household variance in labor income.

More permanent effects could be a result of underlying changes in the structure of the labor market. As the return to labor, the outside option to investment in human capital, decreases, an answer could be to increase enrollment rates and thereby human capital in the affected areas in the long run. Such a response corresponds to the results of Skidmore & Toya (2002) finding that recurrent natural disasters lead to increased investment in human capital and higher labor productivity in the long run. Another way to accommodate the relative abundance of low-skilled labor is out-migration of workers, as found by Boustan et al. (2017) and Hornbeck & Naidu (2014).

Another possibility is that the shock changes the sectoral composition in the labor market. If the workers move to more productive sectors than agriculture, and there is a sustained increased demand for unskilled labor, this would have long term positive effects on work incomes. If this were the case, we would see a significantly lower employment share in agriculture in the affected areas after the flood. Additionally, we should observe an increased employment in the construction sector. In section 7.2 I test these possible answers to the decrease in work income.

5 Data

The dataset used here for the empirical analysis is comprised of geographical data on the flood coverage, physical characteristics of localities across Tabasco (including elevation, distance to the main rivers and crop suitability), labor market characteristics of the population, and night light intensity at the locality level. Below, I will go through the details of each data source.

5.1 The Flood

The spatial data on the coverage of the flood has been provided by the British NGO MapAction which specializes in providing maps for humanitarian crises. They have been operating since 2003 and are one of the first to collect data and make maps for the outreach and severity of a crisis such as a flood MapAction.org. The flood map provides an approximation of the water coverage as this cannot be mapped with 100 percent precision due to cloud cover obstructing the view from the satellites. To mitigate this, I create a continuous flood border representing the outreach of the flood. This is done in ArcGIS using the buffer tool. The distance from each locality to the flood border is calculated using the near tool. Further, I transform the distance-measure to the log distance from the locality deepest within the flooded area. In this way, it is possible to assess whether the effects vary across the state. The outreach of the flood and the flood border is presented in Figure 2. I define the binary measure of being within the flooded area or not as representing the extensive margin and the distance-measure as the intensive margin.

5.2 The National Survey of Occupation and Employment (ENOE)

The main data source is the quarterly sampled household survey, the National Survey of Occupation and Employment (ENOE) administered by the Mexican government's Instituto Nacional de Estadística y Geografía (INEGI). ENOE is a national and state representative rotating panel, which has been consistently sampled since the first quarter of 2005. Each household enters in four consecutive quarters with one fourth being resampled in each period. I use the data as a repeated cross-section. All municipalities are represented in each period, and it includes the population from ages 12 to 97. The smallest geographical identifier in the data is location (*localidad*) which in urban areas is a place with at least 2500 inhabitants, and in rural areas a place which has a name, but less than 2500 inhabitants. This variable is unique to ENOE, compared to other micro sets containing the labor income in Mexico. ENOE includes socio-economic characteristics, such as age, marital status, educational level, gender etc. My main income variable is the categorical income, where the respondent is asked to place his/her work income on a scale relative to the minimum wage in the area. The scale spans from zero (no income or below the minimum wage) to five (more than five times the minimum wage)[1], which I recode to values between zero and one. For paid employment the work-income is the take home pay for the main job only, and for self-employment it is the profit of the enterprise (receipts less operating expenses, not including production for own consumption). Here I use the entire population in the data between ages 12 and 97, as 20 percent of those above 65 are still earning a positive income. By using the entire population I am able to analyze whether the disaster affected participation in the labor market. Additionally, I use the share of the population earning zero (or below the minimum wage) work income. This group consists of those not working, and those either employed or self-employed without receiving any positive work income. I also analyze the labor market changes looking at sectors of employment, enrollment in school (all levels), weekly work hours, being active in the labor market vs. being unavailable, formal or informal employment, and working vs. being unemployed. The full summary table is relegated to Appendix Table A.1.

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[1]The primary purpose of the ENOE is not to analyze income and expenditure, which is done by the biannual survey la Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH). I therefore use the categorical income as there are fewer missing observations than for the continuous income variable. ENIGH is not representative at the state level and has municipality as the lowest level of geographical identifier. It is therefore not possible to use ENIGH to analyze the effect of the flood at the locality level.

The data covers the state of Tabasco during the period from 2005q1 (the first quarter of 2005) to 2016q1 (the first quarter of 2016). The sample size is around 4000 observations in each quarter, representing a population of around one million people, distributed over 66 to 70 different locations. I exclude the center of the capital city Villahermosa in the analysis as this area was highly affected and violates the common trend assumption being highly different from the remaining state. Figure 1 shows that there are no signs of migration to or from the flooded area in the immediate aftermath of the flood. I further check the effects on demographic characteristics in section 8. However, from 2013 there was a drop in the population within the flooded area probably not related to the flood. Appendix Figure A.9 shows the spatial distribution of localities included in ENOE across Tabasco in each year. In 2013, 13 localities closely located in the right corner of the state were included, creating the relatively smaller sample of people within the flooded area. In the years prior to 2013, the localities were spread across the state, confirming spatial representation. To avoid spurious results, the analysis is restricted to five years after the disaster. Unless otherwise stated, the period of analysis is from 2005 to 2012.

Figure 1: Development of the population size normalized to 2005 q1
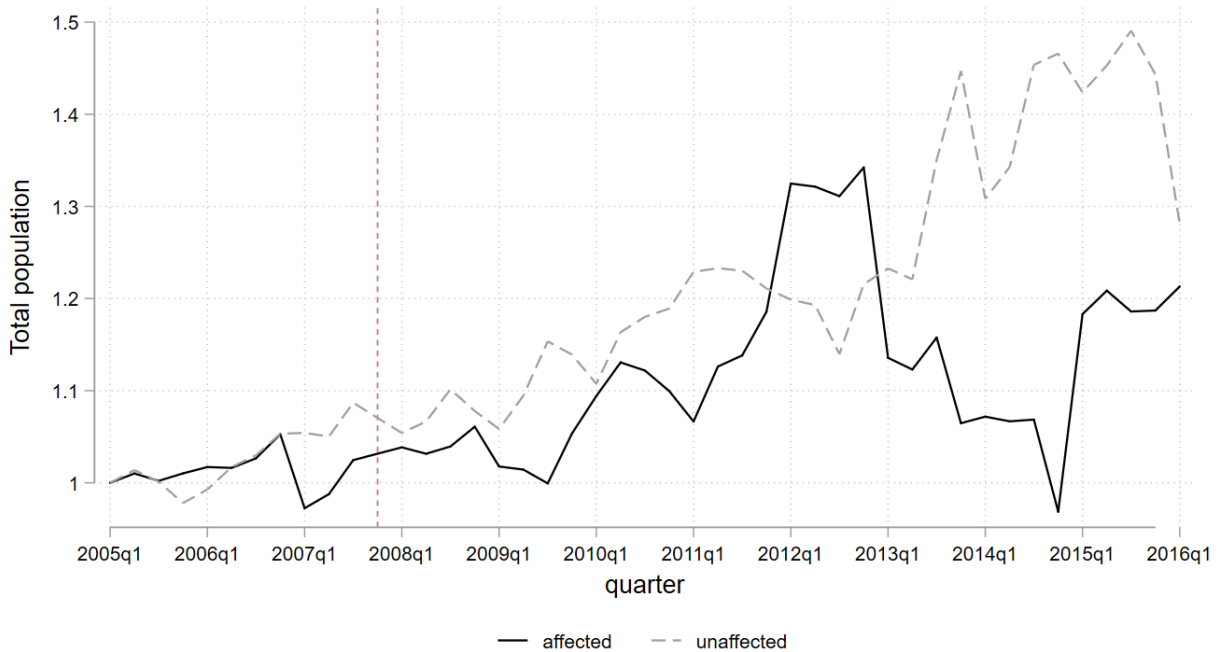

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Figure 2 shows the state of Tabasco, the extent of the flood and the localities included in analysis colored by distance to the flood border. The blue areas are the extent of the flood, connected with a line representing a continuous flood border. The dark red points are the centers of the localities most affected by the flood, and the dark blue point are the least affected, measured by the distance to the flood border. We can hereby see that the water affected several localities spread over the entire state and not just restricted to a specific area close to the main rivers.

Figure 2: The state of Tabasco, the localities in ENOE by distance to the 2007 flood and Tabasco's location in Mexico
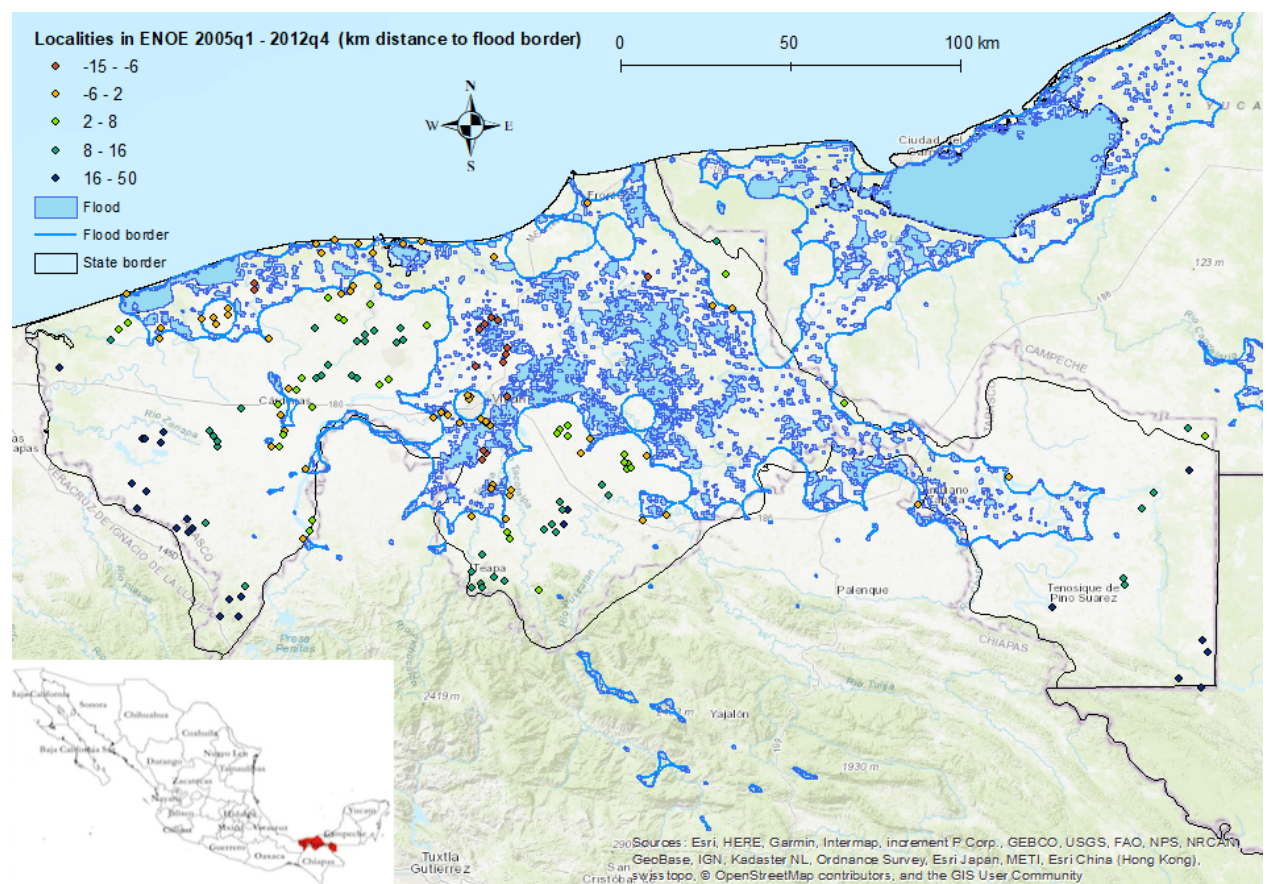
Source: ENOE and MapAction

Note: The colors of the localities represent the distance to the flood border, where the dark red colors are those mostly within the flooded areas (negative distance). The dark blue points represent the localities furthest away from the flood.

5.3   Additional data

In a robustness check, night light is used as an alternative measure for economic activity. These data are collected by the US Air Force Defense Meteorological Satellite Program Operational Linescan System (DMSP-OLS). The NOAA's (National Oceanic and Atmospheric Administration) National Geophysical Data Center (NGDC) cleans the data sampled by satellites and publishes an average annual light intensity for grids of around 1 km covering the entire world[2]. The data is coded on a range from 0 to 63, representing the average light intensity over the course of a year. The data of the night light is found by Henderson et al. (2012) to correlate with economic activity, and with the fine level of granularity it can be used to assess how fast economic activity returns to an area after a negative shock like a natural disaster or war. The night light data is available for the years 1992-2013, but to ensure comparability with the remaining analysis I use the time period 2005-2012. I pair the night light data with the locality data in ArcGIS by extracting the night light intensity at the centroid of the locality.

The geographical variables include crop suitability to control for the production of cash crops versus consumption crops. Tabasco is the largest producer of cocoa in Mexico and can also account for 40 percent of the country's banana production. It has been estimated that damages to these crops alone amounted to 480 million USD(MexicanRedCross, 2010) and that 28 percent of the economic impact of the flood was on the agricultural sector (FAO, 2015). The main consumption crops are maize and sorghum, providing a basic staple among especially poor households. The source for these data is FAO (Fischer et al., 2012). The data is provided as raster data and is paired with the locality data by extracting the suitability at the center of the locality. I use the measure of suitability with a low level of inputs ranging from a minimum of zero to a maximum of nine. Additional controls include the distance to the main rivers Rio Grijalva and Rio Usumacinta, as well as to the capital city Villahermosa. These are calculated in ArcGis using the near tool providing the distance in kilometers to the nearest point on the rivers or the center of the city.

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[2]The data used can be accessed at http://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html

6 Estimation framework and analysis of pre-trends

A concern is that the localities within the flooded area were significantly different from those outside leading to different developments in the period after the flood. In this section, this is tested by looking at whether key variables differ systematically across flooded and not-flooded localities in the period leading to the flood, 2005q1 - 2007q3:

$$Y_{ilt} = \gamma flood_l + \kappa_{mt} + \omega X_{ilt} + \lambda W_l + \varepsilon_{ilt} \tag{1}$$

where Y_{ilt} is the characteristic being analyzed for individual i in locality l measured at time t in the pre-period. These characteristics are outcomes analyzed and the confounders included in the main analyses in Tables 2. $flood_l$ is a dummy indicating whether the locality is lying within the flood border or not. The results are similar when using the distance measure instead (Appendix Table A.2). κ_{mt} are municipality times year fixed effects also included in the main analysis. As the treatment measure does not vary over time it is not possible to include locality fixed effects. X_{ilt} are the baseline individual characteristics of age, marriage status, and gender. W_l are the locality-characteristics elevation and crop suitability.

Table 1 shows the means, standard errors, and sample size over the entire period of analysis from 2005q1 to 2012q4 in column (1) and (2), respectively. The equivalent for the pre-period is presented by column (3) and (4). Column (5) presents the results of equation 1 with no controls showing that there were unconditional differences in the levels across localities inside and outside the flood for most characteristics. In column (6) the results of the conditional differences are presented, showing that there were still differences in income with those living within the flooded area having a higher income than those outside. This is supported by the share earning zero income having been lower inside the flooded area. The educational level was also higher inside, and with fewer currently enrolled. The agricultural sector was smaller, whereas the service sector was larger, and there were more people formally employed. Being formally employed means that the worker has labor rights and social protection. Only one-third of the workers in Tabasco were formally employed, (Table 1 column (1)) meaning that the majority did not have any rights in terms of being laid off or injured.

My identification strategy, presented in section 6, hinges on common trends, and not common levels. In order to investigate changes over time I aggregate the data to locality-quarter

level and calculate the quarterly change in the dependent variable for each locality. In cases where there were more than one quarter between two observations of the same locality I use the average quarterly change. The below equation estimated at the locality level is used:

$$\bar{Y}_{lt} - \bar{Y}_{l,t-1} = \gamma flood_l + \kappa_{mt} + \omega \bar{X}_{lt} + \lambda W_l + \varepsilon_{lt} \tag{2}$$

where $\bar{Y}$ and $\bar{X}$ are weighted locality-quarter means of the variables. $\bar{Y}_{lt} - \bar{Y}_{l,t-1}$ was the change in the variable from the prior quarter $t-1$ to the current quarter t. Column (7) and (8) of Table 1 present the results of the pre-trend analysis. There are no differences across the development in any of the included characteristics between the flooded and not-flooded localities. The results are the same for the raw differences and including the baseline characteristics. Appendix Table A.2 shows that there are no differences in pre-trends across distance to the flood border.

Table 1: Baseline characteristics, by being flooded or not in 2007

	2005q1-2012q4		2005q1-2007q3					
					Levels		Changes	
	Sample mean	N	Sample mean	N	Raw	Controls	Raw	Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Categorical income	0.216	133,308	0.213	49776	0.046***	0.032***	0.000	-0.000
	(0.315)		(0.314)		(0.003)	(0.005)	(0.003)	(0.006)
Zero income	0.609	133,308	0.611	49776	-0.032***	-0.025***	0.000	0.002
	(0.488)		(0.488)		(0.005)	(0.009)	(0.005)	(0.009)
Years of schooling	7.857	135,270	7.540	49992	0.750***	0.515***	0.020	-0.011
	(4.316)		(4.316)		(0.042)	(0.073)	(0.032)	(0.060)
Enrolled	0.2069	135,334	0.223	49,996	-0.012***	0.007	0.003	0.002
	(0.405)		(0.416)		(0.004)	(0.007)	(0.003)	(0.005)
Sector employment								
Agriculture	0.1079	135,334	0.119	49,996	-0.058***	-0.026***	0.001	0.004
	(0.310)		(0.323)		(0.003)	(0.006)	(0.003)	(0.005)
Construction	0.0399	135,334	0.0393	49,996	0.008***	-0.001	-0.001	0.000
	(0.196)		(0.194)		(0.002)	(0.004)	(0.002)	(0.004)
Retail	0.0842	135,334	0.0775	49,996	0.012***	0.007	0.001	0.000
	(0.278)		(0.267)		(0.003)	(0.005)	(0.003)	(0.005)
Service	0.1709	135,334	0.163	49,996	0.053***	0.019***	0.000	-0.007
	(0.376)		(0.369)		(0.004)	(0.007)	(0.003)	(0.006)
Manufacturing	0.0350	135,334	0.0338	49,996	0.002	0.002	0.000	-0.001
	(0.184)		(0.181)		(0.002)	(0.003)	(0.002)	(0.004)
Mining	0.0239	135,334	0.0207	49,996	-0.005***	-0.005*	0.001	0.003
	(0.153)		(0.142)		(0.001)	(0.003)	(0.002)	(0.003)
Formal employment	0.3250	67,080	0.3297	24,203	0.109***	0.072***	0.003	0.004
	(0.468)		(0.470)		(0.007)	(0.013)	(0.007)	(0.013)
Weekly workhours	20.7133	135,334	20.604	49,996	2.601***	0.168	-0.108	-0.276
	(25.311)		(25.176)		(0.251)	(0.430)	(0.249)	(0.474)
Outside the labor force	0.4775	135,328	0.4981198	49,994	-0.035***	-0.004	-0.001	0.005
	(0.499)		(0.500)		(0.005)	(0.008)	(0.004)	(0.008)
Working	0.4957	135,334	0.484	49,996	0.035***	0.009	0.000	-0.006
	(0.500)		(0.500)		(0.005)	(0.009)	(0.004)	(0.008)
Receive economic support	0.282	135,334	0.291	32,082	0.065***	0.031***	0.000	-0.007
	(0.450)		(0.454)		(0.005)	(0.007)	(0.007)	(0.010)
Age	34.586	135,261	34.085	49949	0.279		-0.034	
	(17.163)		(17.163)		(0.174)		(0.102)	
Male	0.481	135,334	0.482	49996	0.007		0.001	
	(0.500)		(0.500)		(0.005)		(0.002)	
Married	0.409	135,334	0.423	49996	0.018***		0.000	
	(0.492)		(0.492)		(0.005)		(0.004)	

Each of the estimates in columns (5)-(8) represent the outcome of one OLS regression. Controls include municipality times year fixed effects, age, gender, marital status, elevation, and crop suitability to sorghum, cacao, maize, and banana. Robust standard errors in parentheses. $*p < .1, **p < .05, ***p < .01$ The number of observations in column (7) and (8) is 669.

The purpose of the empirical analysis is to scrutinize the effect of the flood on the labor market. Figure 3 present a kernel-weighted local polynomial fit between the work income relative to the flood border before and after the flood. The graph shows that those living further away had a lower income in the pre-flood period. The mean income over the five years period after the flood was not affected for those living outside the flood border. On the other hand there were large variations within the flooded area, with those living deepest within experiencing the largest drop in income. These variations point to the relevance of looking at differences across an intensity measure.

Figure 3: Development of the locality mean categorical income over time
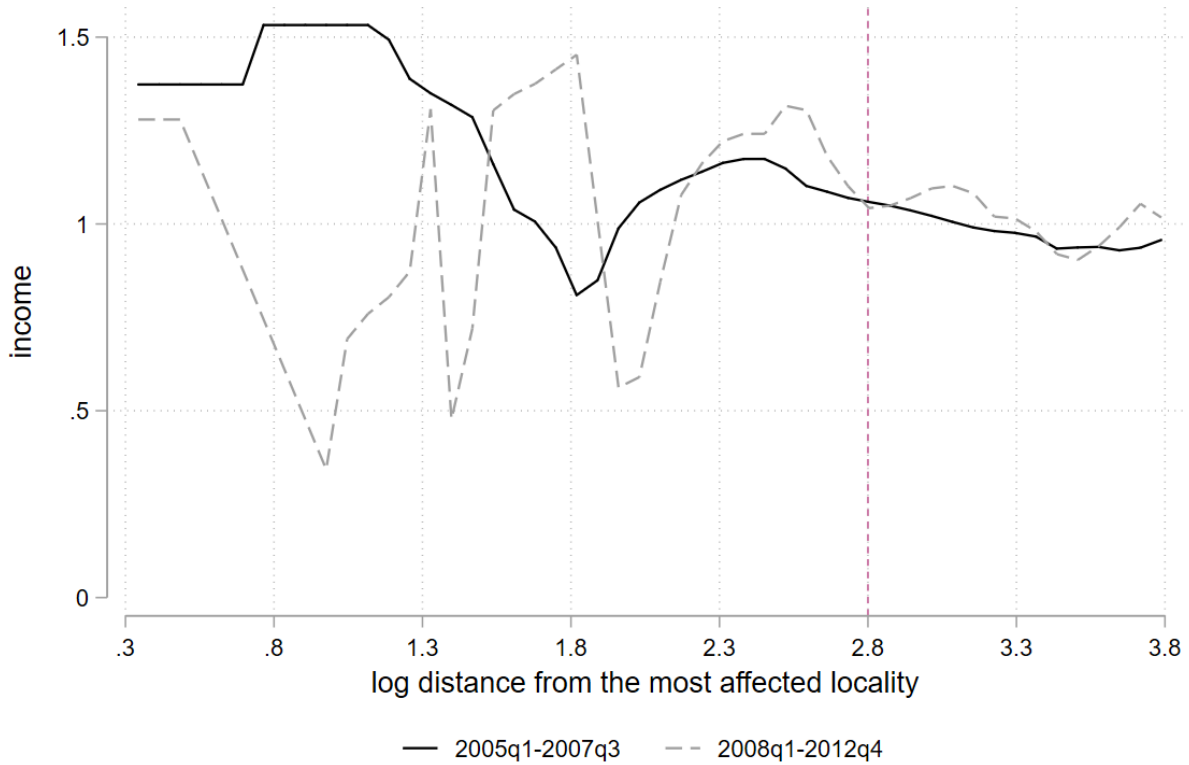
The vertical line represents being inside or outside the affected area. Below 2.8 is within the flooded area, above is outside. The lines represent the kernel-weighted local polynomial fit

In the first part of the empirical analysis the effect is analyzed using a differences-in-difference setting:

$$y_{ilt} = \gamma A_l * T_t + \kappa_l + \kappa_{mt} + \kappa_q + \omega X_{it} + \lambda_t W_l + \varepsilon_{ilt} \tag{3}$$

The main specification uses the categorical income of individual i in a locality l at time t as the dependent variable (y_{ilt}) estimated on the flood intensity of the locality (A_l) times an indicator for time being before or after the flood (T_t). κ_l includes locality fixed effects controlling for mean differences in incomes across localities, κ_{mt} controls for linear municipality-specific time trends, and κ_q is quarter fixed effects included to account for seasonality. X_{it} are the relevant individual characteristics; age, age squared, gender, years of education, years of education squared, and marital status[3]. W_l captures the geographical locality characteristics longitude, latitude and elevation, and crop-suitability to banana, maize, cacao and sorghum, interacted with a year dummy to control for time-specific spatial correlation. In this initial set-up the effect over the entire period after the flood is compiled in the parameter γ and the results are only valid if the common trend assumption is credible. γ represents the effect of being further away from the flood.

One way to control for pre-trends in the outcome variable and to follow the effect in the aftermath of the flood, is to estimate an event study model including both leads and lags. This implies that the parameter of interest varies over time as described below:

$$y_{ilt} = \sum_{t=2005q1}^{2007q3} \gamma_t A_l + \sum_{t=2008q1}^{2016q1} \gamma_t A_l + \kappa_l + \kappa_{mt} + \kappa_q + \omega X_{it} + \lambda_t W_l + \varepsilon_{ilt} \tag{4}$$

Note that γ_t is now time varying and thereby estimating the difference in work income of individuals in localities more or less affected by the flood relative to the fourth quarter of 2007 where the flood hit the state. The lead periods are 2005, 2006 and the first three quarters of 2007.

In all specifications the robust standard errors are clustered at the locality level to adjust for heteroskedasticity and within-locality correlation over time, as recommended by Bertrand et al. (2002)[4]. All estimations use survey weights ensuring state representativeness.

The main analysis uses either a binary measure of being inside or outside the flooded area or a measure of the intensity of flooding based on the log distance to the flood border, with a

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[3]I do not include sector of work, as this is likely to be affected by the flood, and thereby endogenous.

[4]The results are robust to using clustering at municipality level, see Appendix Table A.4

low value for more affected localities. The localities with the darker red color in Figure 2 thus have a log distance close to zero, whereas those with a dark blue color have a high log distance.

7   The effect on work income

Table 2 presents the results of equation 3, using both the binary measure of being affected or not and the distance measure of being log km away from the flood border. The results indicate that being inside the flooded area had a negative effect on the work income after the flood. The estimates are robust to including a variety of controls. As years of schooling may be an endogenous variable if the flood affected enrollment, the main specification includes the exogenous individual level controls age, age squared, gender, and marital status. The main specification predicts 3.3 percentage points lower incomes for those living within the flooded area over the five years following the disaster. Looking at the effect across the distance moving 100 percent further away from the most affected area increased income by 2.2 percentage points. Using the intensity measure of distance to the most affected locality puts emphasis on the intensive margin where localities deeper within the flooded areas were also more likely to experience a severe effect. In the same manner is it likely that localities just outside the flood border were also economically affected by the flood due to destruction of infrastructure, and thereby reduction of market access.

Table 2: Effect on categorical work income

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Categorical income [0;1]				
Inside*post	-0.0469**	-0.0473***	-0.0334**	-0.0329***				
	(0.019)	(0.016)	(0.014)	(0.012)				
Distance*post					0.0179*	0.0304***	0.0220**	0.0211***
					(0.009)	(0.011)	(0.009)	(0.007)
Age			0.0253***	0.0236***			0.0253***	0.0236***
			(0.001)	(0.001)			(0.001)	(0.001)
Age squared			-0.000278***	-0.000245***			-0.000278***	-0.000245***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.225***	0.216***			0.225***	0.216***
			(0.004)	(0.004)			(0.004)	(0.004)
Married			0.0146***	0.00742***			0.0146***	0.00748***
			(0.003)	(0.003)			(0.003)	(0.003)
Years of schooling				-0.000897				-0.000896
				(0.001)				(0.001)
Years of schooling squared				0.000980***				0.000980***
				(0.000)				(0.000)
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.0339	0.0349	0.287	0.324	0.0338	0.0350	0.287	0.324
N	133308	129815	129815	129757	133308	129815	129815	129757
Mean DV	0.211	0.211	0.211	0.211	0.211	0.211	0.211	0.211

OLS estimates. All estimations include locality quarter, municipality*year fixed effects. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

The results in Table 2 show the effect over all five years after the flood combined. The large effect on work income is supported by estimations of equation 4. The results on the categorical income are relegated to the Appendices and can be found in Appendix Figures A.1 and A.2. Figure A.1 shows that the effect was largest in the immediate aftermath of the flood, and diminished after only two years. This is in correspondence with results found by Kocornik-Mina et al. (2015) that floods do only have short-term effects on economic activity. Figure A.2 shows the more persistent effect on the extensive margin with lower incomes within the affected area in the entire period after the flood. The results show no signs of decline in differences between incomes. Additionally, I have included an estimation of the effect in the full time period from 2005 to 2015 in Appendix Figures A.3 and A.4. The two figures show how the inclusion of the 13 localities outside the flooded area affect the results from 2013 to 2015.

In order to understand the distribution of the lower work income, I create a binary variable

of earning a strictly positive income or not. Estimating equation 4 on this binary variable shows that a large share of the drop in income can be explained by an increasing share of the population earning zero income, see Figure 4 panel (a). Doubling the distance from the most affected locality decreases the risk of earning zero income by 3-4 percentage points in the two years period after the flood. Splitting the sample and estimating solely on the population earning a strictly positive work income reveal that the drop in return to labor only lasted for a single year, see Figure 4 panel (b). Looking at this sub-sample, I find significant effects solely for the third and fourth quarter of 2008, where the wages were higher for those living further away from the flood. Appendix Figure A.5 depicts the effects across the extensive margin of being inside or outside the flooded area. The figure confirms that the effect on the share earning zero income is more persistent than the negative effect on the strictly positive income.

Figure 4: Estimated differences across distance to the flood border, relative to 2007q4

(a) The share of the population earning zero income   (b) Effect on the strictly positive income

Panel (a) reports the estimated effect on the share of the population earning zero income by log distance to the flood border, and panel (b) the effect on those earning a strict positive income. From estimating equation 4 the included covariates are locality, municipality*year and quarter fixed effects, age, age squared, gender, marital status, and latitude, longitude, elevation, and crop suitability interacted with a year dummy. The dashed lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. Panel (a): N = 131,141, Clusters = 261, Adj. R^2 = 0.29. Panel (b) N = 51,513, Clusters = 159, Adj. R^2 = 0.25

In the main analysis I use the full population in the data set, and thereby the population ages 12-97. In order to check whether the results are driven by people outside the working age, the main results are estimated on the working age population (ages 15-64). The results are robust to this smaller population (see Appendix Table A.5), although the point estimates are a bit

higher. In the main analysis I use the categorical income variable, as there are fewer missing observations than for the continuous income variable and it is generally thought to be less prone to misreporting. Appendix Table A.6 presents the results using the log of the continuous income variable instead. The results are generally robust to the change in dependent variable, although the effect on the intensive margin, becomes less significant. The most affected place in Tabasco was the capital city Villahermosa, which is excluded from the main analysis as the center of the city does not follow the same trend as the rest of state. In order to test if the impact of close proximity to the capital city and thus proximity to the center of both trade and the flood changed over time, I include the distance to Villahermosa interacted with year in a robustness check. Appendix Table A.7 shows that the results are robust to including this distance control. Another concern is that the impact of being close to the rivers changes over time, as localities closer to the main rivers are more likely to be flooded but also have better access to fishing which is a food source not destroyed by the flood. Appendix Table A.8 presents results controlling for the distance to one of the main rivers in the state. The results increase slightly, but not significantly, with inclusion of distance to a river interacted with year. In order to check whether spatial dependence between observations is a threat to the results, I present the main results using Conley standard errors in Appendix Table A.9. The high significance of the results is robust to correcting for spatial correlation.

In order to understand the compositional distribution of the lower work income, I interact the treatment measure with the sector of work. As expected, agricultural workers had the lowest income and were also affected to a larger degree than the rest of the population. This was also the group with the largest share of workers earning zero income. The opposite is true for the service sector, where the work income was high, and was affected positively by the flood. The remaining sectors were not affected significantly different, and the overall measure is robust to their inclusion. The insignificant result on income in the construction sector supports the fact that the rebuilding initiatives had little effect on the local population. The results are supported by results using the binary treatment measure which show no differences across sector of employment (Appendix Table A.10).

Table 3: Heterogeneous effects on categorical work income

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Categorical income [0;1]					
Distance*post	0.0205**	0.0210**	0.0238***	0.0197***	0.0220**	0.0208**
	(0.008)	(0.009)	(0.009)	(0.007)	(0.009)	(0.008)
Agricultural	-0.0344***					
	(0.008)					
Agricultural*Distance	0.00716**					
	(0.003)					
Construction		0.223***				
		(0.011)				
Construction*Distance		0.00474				
		(0.003)				
Retail			0.151***			
			(0.010)			
Retail*Distance			-0.00116			
			(0.003)			
Service				0.278***		
				(0.009)		
Services*Distance				-0.00946***		
				(0.003)		
Manufacturing					0.119***	
					(0.011)	
Manufacturing*Distance					-0.000916	
					(0.004)	
Mining						0.463***
						(0.013)
Mining*Distance						-0.00420
						(0.005)
Adj. R^2	0.288	0.308	0.304	0.376	0.292	0.327
N	129815	129815	129815	129815	129815	129815
Mean DV	0.211	0.211	0.211	0.211	0.211	0.211

OLS estimates. All estimations include locality quarter, municipality*year fixed effects, and the baseline controls. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

7.1 Employment effects

From analyses of the immediate effects of the flood, the agricultural sector has been pointed out as the sector most affected (CEPAL et al., 2008), the same sector where I find the largest decline in income. The severe damage of the agricultural production could have led to workers seeking other job possibilities and thereby a smaller agricultural sector in the most affected areas compared to the unaffected. This effect is found by Cameron & Worswick (2003) in the

Indonesian case where sudden crop loss led not to increased working hours, but a change in job composition. Given that the agricultural sector is the least productive with the lowest return to labor, a decrease in the employment in agriculture could have long-term positive effects. Similarly the positive effect on wages in the service sector could have positive effects. In order to analyze the effect on the sectoral composition in Tabasco, I estimate equation 3 on a dummy for employment in a given sector. Table 4 Panel (a) reveals that there were no effects on the sector of employment in the aftermath of the flood, except a borderline significant increase in retail for those most affected by the flood. For the binary measure of the flood presented in Table 4 Panel (b) we see a decrease in the number of workers in manufacturing, corresponding to the fact that physical capital like factories were destroyed by the flood. Appendix Figure A.6 confirms that there were no direct effect of the flood on the sector of employment over time in relation to the distance to the flood border.

Table 4: Effect on sector of employment

	(1)	(2)	(3)	(4)	(5)	(6)
	Agriculture	Construction	Retail	Service	Manufacturing	Mining
Panel (a)						
Distance*post	-0.00456	0.00384	-0.0131*	0.0102	0.00104	0.00267
	(0.011)	(0.004)	(0.007)	(0.011)	(0.004)	(0.005)
Adj. R^2	0.252	0.0639	0.0261	0.0864	0.0213	0.0603
N	131807	131807	131807	131807	131807	131807
Mean DV	0.112	0.0405	0.0816	0.168	0.0357	0.0213
Panel (b)						
Inside*post	0.0202	-0.00250	0.00474	-0.00494	-0.0127**	0.00309
	(0.013)	(0.007)	(0.012)	(0.015)	(0.006)	(0.008)
Adj. R^2	0.252	0.0639	0.0261	0.0864	0.0214	0.0603
N	131807	131807	131807	131807	131807	131807
Mean DV	0.112	0.0405	0.0816	0.168	0.0357	0.0213

OLS estimates. All estimations include locality quarter, municipality*year fixed effects, and the baseline controls. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

The general lack of significant changes in the employment composition in the aftermath of the flood corresponds to the results found by McKenzie (2003) analyzing the coping strategies of Mexican households after the 1994 devaluation of the Mexican peso. They also find that the Mexican households do not cope with an aggregate shock to their income by changing their

work supply, but rather that the consumption bundle is changed.

7.2 Mechanisms

In this section I analyze the underlying mechanisms behind the increase in the share of the population earning zero income. There are multiple likely underlying mechanisms behind the increase in zero income. One could be that the workers lost their employment, whereby we would see an increase in unemployment. The lower demand for labor following the destruction of harvest (FAO, 2015) could have led to lower wages, and for the informal workers of Tabasco a possible fall to below minimum wage levels. If this were the case, we would see an increase in the number of workers having employment but receiving zero (or below the minimum wage) income.

Another possibility is that younger cohorts enrolled in school again as the return to labor decreased and thereby the opportunity cost of education. A last possibility is that the reduced demand for labor made people redraw from the labor market, increasing the unavailable share of the population. To test whether any of these labor market changes were the underlying mechanisms, I use equation 3 to estimate the differences across the two treatment measures after the flood. The results are presented in Table 5. The intensive treatment measure of log distance from the flood border show the expected decrease in employment without receiving a work income above the minimum wage, lower enrollment, fewer people not available for the labor market, and fewer receiving economic support the further away from the flood we move. None of these results are strongly or at all significant. Looking at the extensive treatment measure of being flooded or not, the results are stronger, indicating that the extensive margin is more important than the intensive. I find that being inside the flooded area increase the likelihood of having a job giving zero income and being enrolled in school. These results are in correspondence with the theory that a large natural disaster reduces productive employment possibilities. It is a common result from developing countries that there is little unemployment (Ball et al. (2011) and Fields (2011)), which is supportive of the result here where there appears to be no effect on unemployment or participation in the labor force. Additionally, I find borderline significant positive effects on the enrollment rates and receipt of economic support. This is in correspondence with the theory that investment in human capital increases when the outside option decreases. The increase in recipients of economic support may also explain the

lack of mitigative actions to the lack of return to labor.

Table 5: Effect on connection to the labor market

	(1)	(2)	(3)	(4)	(5)
	Employed with no pay	Unemployed	Enrolled	Not available	Receive economic support
			Panel (a)		
Distance*post	-0.0158*	0.000811	0.00462	-0.00963	-0.0103
	(0.009)	(0.007)	(0.017)	(0.015)	(0.021)
Adj. R^2	0.0286	0.0186	0.499	0.352	0.214
N	131734	131734	60428	131734	52046
Mean DV	0.0945	0.103	0.436	0.481	0.290
			Panel (b)		
Inside*post	0.0237**	0.00969	0.0366*	-0.0117	0.0836*
	(0.011)	(0.010)	(0.021)	(0.016)	(0.042)
Adj. R^2	0.0286	0.0186	0.485	0.352	0.214
N	131734	131734	131734	131734	52046
Mean DV	0.0945	0.103	0.207	0.481	0.290

OLS estimates. All estimations include locality, quarter, municipality*year fixed effects, and the baseline controls.

Standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

In the main analysis I focus on the individual income. However, if the household rearranged the income generation across the members so that one member became the primary breadwinner, we would see this increase in persons earning zero work income. If, for example, one from the household started to work within the household to rebuild the assets of the family, he/she would be identified as unemployed, not available at the labor market, or working domestically receiving zero income. Such a respond would result in a smaller effect on the household income, and thus the consumption possibilities, although also a higher variation within the household. Table 6 shows the effect of the flood on household income confirming the result from 2, namely a significant and sizable negative effect of the flood both using the binary measure and the distance measure. This indicates clearly that the affected households were not capable of mitigating the negative income shock by changing the labor supply of the household, but on the contrary the flood had even stronger impacts on household income. On the extensive margin I also find a decrease in the variance of the household income, indicating that they were not compensating the lower income by rearranging income generation across members, and an increase in the share of households where no one had a strictly positive income.

Table 6: Effect on household income

	(1)	(2)	(3)	(4)	(5)	(6)
	HH income	Var of HH income	Zero HH income	HH income	Var of HH income	Zero HH income
Inside*post	-0.136***	-0.0285***	0.0464**			
	(0.047)	(0.009)	(0.023)			
Distance*post				0.0877***	0.0101	-0.0325
				(0.027)	(0.007)	(0.020)
Adj. R^2	0.240	0.132	0.105	0.240	0.131	0.105
N	44184	39310	44184	44184	39310	44184

OLS estimates. All estimations include locality quarter, municipality*year fixed effects, the mean household baseline controls, and number of persons in the household between 12-97. HH stands for Household, and Var is the variance. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Looking more into the distributional effects of the drop in productive employment by interacting the treatment measures with groups expected to be affected to a larger or smaller degree revealed that the effect on the intensive margin was strongest for males (Table 7). I find no differences across educational attainment, and only weakly on being formally or informally employed. With respect to the external margin of being flooded or not, males had a much higher risk of zero work income in the flooded area.

Table 7: Heterogeneous effects on earning below the minimum wage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Zero work income [0;1]				
Distance*post	-0.0301***	-0.0366***	-0.0238***	-0.0369***				
	(0.009)	(0.010)	(0.009)	(0.012)				
Inside*post					-0.0160	0.0182	0.0404**	0.0482**
					(0.016)	(0.018)	(0.020)	(0.023)
Male	-0.380***	-0.363***	-0.357***	-0.0305***	-0.377***	-0.363***	-0.357***	-0.0302***
	(0.014)	(0.012)	(0.012)	(0.007)	(0.014)	(0.012)	(0.012)	(0.007)
Male*Distance	0.00868**							
	(0.004)							
Male*Affected					0.0906***			
					(0.022)			
Age	-0.0452***	-0.0457***	-0.0445***	-0.0313***	-0.0452***	-0.0452***	-0.0445***	-0.0313***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age*Distance		0.000314***						
		(0.000)						
Age*Affected						0.000232		
						(0.000)		
Years of schooling			-0.00999***				-0.00990***	
			(0.001)				(0.001)	
Years of schooling*Distance			-0.000124					
			(0.000)					
Years of schooling*Affected							-0.00200	
							(0.002)	
Formal employment				-0.126***				-0.109***
				(0.010)				(0.007)
Formal employment*Distance				0.00740*				
				(0.004)				
Formal employment*Affected								-0.0182
								(0.015)
Adj R^2	0.287	0.287	0.292	0.119	0.287	0.286	0.292	0.119
N	129815	129815	129757	63484	129815	129815	129757	63484
Mean DV	0.611	0.611	0.611	0.198	0.611	0.611	0.611	0.198

OLS estimates. All estimations include locality, quarter, municipality*year fixed effects, and the baseline controls.

Standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

8 Robustness checks

In this section I test the validity of the main results of a decreased work income in the immediate aftermath of the flood and a longer-lasting increase in the share earning zero income.

One concern is whether the results are driven by migration changing the composition of workers in the flooded area. As depicted in Figure 1, there are no indications of changing population sizes across the flood border. A more formal test of selection away from (or into) the flooded area is to look at demographic differences across treatment status using equation 3 (Bharadwaj et al., 2018). The results are presented in Appendix Table A.11 with age, male, years of schooling, and marital status as dependent variables. There are no differences in demographic characteristics relative to the flood except for a decreased share of males inside the flooded area. This indicates that there is a possibility of men migrating to find work somewhere else due to the lower productive employment possibilities. However, as neither the population size nor any of the other demographic variables were affected the result of men migrating is not robust.

Next, I test the validity of treatment status. Despite the fact that localities closer to the flood may have been affected by changed access to markets and other factors, I do not expect this to be a major factor in comparison to those directly affected by the flood. Splitting the sample into the two groups of within and outside the flood border, I check whether the flood had significantly different effects within the groups relative to the distance to the flood border. The results are presented in Appendix Table A.12. While there were no significant differences across the localities outside the flood border relative to the distance to the flood border, the main results of lower income for the most affected and an increased share of zero income earners prevail for those inside the flooded area. This confirms that while the extensive margin dominates, the intensive margin across the affected localities is significant.

8.1   Alternative measure of economic activity

An alternative measure of economic activity is the night lights as used by among others Kocornik-Mina et al. (2015) and developed by Henderson et al. (2012). Using the night light data as an alternative measure of economic activity, gives the possibility of seeing whether there were effects of the flood on a yearly basis on the economic activity in the affected areas. The level of analysis here is the locality level, and I therefore use the weighted means of the individual level characteristics. I estimate the night light intensity y at locality l at time t using the below equation:

$$y_{lt} = \gamma A_l * T_t + \kappa_l + \kappa_t + \kappa_q + \omega X_{lt} + \lambda_t W_l + \varepsilon_{lt} \tag{5}$$

where X_{lt} is now the weighted locality mean of the individual baseline characteristics age, age squared, male, married, years of schooling, and years of schooling squared. Using the municipality times year fixed effects result in too many controls in this estimation, and κ_t is therefore now only year fixed effects. As can be seen from Table 8 there were no significant differences in the intensity of light between the flooded and non-flooded localities, or across the distance to the flood border. In column (1) and (2) 228 localities in the state are represented for each year, and we therefore see a higher number of observations. Controlling only for locality and year fixed effects result in significant though opposite effects of the flood. Including the standard controls decreases the estimate and they become insignificant, though the signs are stable. The results on night lights indicate that economic activity did not decrease in the affected area, which is supported by the labor market analysis where I find no effects on the sector of employment or the number of unemployed. The higher night light intensity in the flooded area, though insignificant, supports the damage analyses concluding that after the 2007 Tabasco flood the population largely returned to their destroyed homes and started rebuilding (Gordillo & Pablos, 2016).

Table 8: Estimated differences in yearly night light intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Night light intensity [0;63]
Distance*post					-1.821***	-0.826	-1.296	-1.246
					(0.516)	(0.641)	(1.100)	(1.130)
Inside*post	2.165***	0.981	1.287	1.196				
	(0.720)	(0.837)	(1.466)	(1.520)				
Age			0.311	0.273			0.315	0.270
			(0.272)	(0.279)			(0.276)	(0.279)
Age squared			-0.00128	-0.000968			-0.00133	-0.00101
			(0.003)	(0.003)			(0.003)	(0.003)
Male			-1.398	-1.076			-1.683	-1.332
			(5.827)	(5.976)			(5.976)	(6.154)
Married			0.609	0.228			0.602	0.267
			(3.844)	(3.930)			(3.874)	(3.944)
Years of schooling				-0.457				-0.587
				(1.523)				(1.490)
Years of schooling squared				0.0369				0.0440
				(0.087)				(0.084)
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Adj. R^2	0.962	0.966	0.969	0.969	0.962	0.966	0.969	0.969
N	2052	2007	734	734	2052	2007	734	734
Mean DV	16.99	16.97	23.96	23.96	16.99	16.97	23.96	23.96

OLS estimates. All estimations include locality and year fixed effects

Robust standard errors clustered at locality level in parentheses

$*p < .1, **p < .05, ***p < .01$

9 Conclusion

In this paper I have presented the analysis of the effects of a major flood on the labor market outcomes in a highly informal developing setting. I used a repeated cross-section labor market survey sampled each quarter from 2005q1 to 2012q4 to estimate the effect of a natural disaster destroying infrastructure and agricultural output in the fourth quarter of 2007. I found that the labor income of the flooded population decreased significantly after the flood. The decrease

in work income was persistent over a five-year period when using the less sensitive treatment indicator of being within the flooded area or not. An intensity measure of the distance to the flood border, indicating how badly affected the locality was, showed significant results for only two years after the flood. The lower income can, to a large degree, be explained by an increase in the share earning zero income or below the minimum wage. This indicates that the labor demand decreased after the flood, especially in the agricultural sector, and possibilities of finding more productive employment in other sectors were not present. There were few mitigating actions taken as response to the lower income, partly as a result of increased economic support, indicating that the main effect was an adjustment to lower consumption. The lower return to labor had small positive effects on investment in human capital as the opportunity cost decreased. The increase in zero-income earners was stronger for males. There were no effects on demographic variables, except for the share of males, or population sizes. The results proved robust to various tests including spatial correlation using Conley standard errors (Conley, 1999), restricting the sample to the working age population, using an alternative individual measure of income, and controlling for distances to the capital city or the main rivers. The results point towards lower return to labor, but not necessarily lower activity levels, as I found no effects on unemployment or participation in the labor force. This conclusion was supported by night light intensity where I found no effects.

An aspect that may have affected the development of the two different groups is if public spending moved from less to more affected areas. A crude estimation of that is the public spending published by INEGI at the municipality level. In the first year after the flood there was a generally high increase in the public spending in the state, but with no differences between the affected and unaffected municipalities. In the following period the public spending in the unaffected areas either decreased or had a lower increase than in the affected areas, indicating that the focus of government money changed. These are however very crude estimates of the public spending at municipality level with an affected municipality being defined as a municipality mentioned as most affected by the Mexican government. The main question addressed here is how the intensity of the flood at the locality affected the labor market. There is little doubt that the recurrent floods, and especially the major 2007 flood, have had a negative effect on the development of the state of Tabasco due to the large costs of mitigation and adaptation (PECC, 2014). As found by Husby et al. (2014), the rebuilding and protection

program following a major flood may have more long-term impacts than the disaster itself. This aspect is highly relevant when evaluating disasters, as the event itself rarely stands unaddressed. But the rebuilding activities are seldom included separately in the evaluations, as in the case of Tabasco especially when high levels of corruption are involved, making the official budgets highly unreliable[5].

Floods are a special kind of natural disaster; they severely destroy physical infrastructure and crops, but rarely kill the population affected. Therefore, they are less likely to hit the big news, despite their magnitude. This paper found that one of the worst floods in the history of Mexico which caused damages of around three billion USD had long-lived effects on the work income of the affected localities compared to the localities outside the affected area, but within the state. The positive effects from rebuilding activities are not found in this paper, as there are no indications of higher demand for unskilled labor or increased employment in the construction sector. As the flooded population returned to their homes after the displacement during the flood, coming back to a destroyed harvest, the results point towards a need for aid not just in the subsequent quarter, but throughout the five-year period following a flood. A main contribution of this paper is the analysis of the differences in the quarterly development, showing exactly when the incomes were at the lowest and whether the affected localities caught up. While this is a study of a particular type of disaster holding the results up to the results previously found in other settings makes it possible to distinguish the courses of long-lasting negative effects. The results presented here indicate that when agricultural production is destroyed, the following lack of labor demand in agriculture mainly results in lower income, instead of movement of labor into more productive sectors. This is applicable to most developing countries with low levels of labor mobility and a high degree of informality, making it possible to work for less than the minimum wage.

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[5]One very recent paper looking specifically at this issue is **?** finding that the Mexican disaster fund Fonden had only short run effects with the non-supported municipalities beginning to catch up after around 15 month

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A   Appendix

Table A.1: Summary table

Variable	Obs	Mean	Std. Dev.	Min	Max
Categorical income	134,689	0.22	0.31	0	1
Zero income	133,308	0.61	0.49	0	1
Years of schooling	135,270	7.86	4.32	0	20
Enrolled	135,334	0.21	0.41	0	1
Sector employment					
Agriculture	135,334	0.11	0.31	0	1
Construction	135,334	0.04	0.20	0	1
Retail	135,334	0.08	0.28	0	1
Service	135,334	0.17	0.38	0	1
Manufacturing	135,334	0.04	0.18	0	1
Mining	135,334	0.02	0.15	0	1
Formal employment	67,080	0.32	0.47	0	1
Weekly workhours	135,334	20.71	25.31	0	160
Outside the labor force	135,328	0.48	0.50	0	1
Working	135,334	0.50	0.50	0	1
Receive economic support	53,497	0.28	0.45	0	1
Age	135,261	34.59	17.16	12	97
Male	135,334	0.48	0.50	0	1
Married	135,334	0.41	0.49	0	1
Elevation	135,334	19.77	32.62	1	400
Crop suitability					
Sorghum	135,334	7.73	0.63	6	8
Cacao	131,807	6.54	0.65	4	7
Maize	135,334	6.53	0.73	5	7
Banana	135,334	6.32	1.04	3	7

Table A.2: Baseline characteristics, by distance to the 2007 flood border

	2005q1-2012q4		2005q1-2007q3					
					Levels		Changes	
	Sample mean	N	Sample mean	N	Raw	Controls	Raw	Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Categorical income	0.216	133,308	0.213	49776	-0.031***	-0.011***	0.001	0.003
	(0.315)		(0.314)		(0.003)	(0.003)	(0.003)	(0.004)
Zero income	0.609	133,308	0.611	49776	0.018***	-0.002	-0.002	-0.004
	(0.488)		(0.488)		(0.004)	(0.005)	(0.004)	(0.006)
Years of schooling	7.857	135,270	7.540	49992	-0.698***	-0.640***	0.006	0.06
	(4.316)		(4.316)		(0.035)	(0.046)	(0.028)	(0.040)
Enrolled	0.2069	135,334	0.2228578	49,996	-0.004	-0.029***	-0.001	0.002
	(0.405)		(0.416)		(0.004)	(0.004)	(0.002)	(0.003)
Sector employment								
Agriculture	0.1079	135,334	0.1185295	49,996	0.035***	-0.015***	-0.001	-0.003
	(0.310)		(0.323)		(0.003)	(0.004)	(0.002)	(0.004)
Construction	0.0399	135,334	0.0392631	49,996	-0.005***	0.004*	0.001	-0.002
	(0.196)		(0.194)		(0.002)	(0.002)	(0.002)	(0.003)
Retail	0.0842	135,334	0.0774862	49,996	-0.005**	0.003	-0.001	0.000
	(0.278)		(0.267)		(0.002)	(0.003)	(0.002)	(0.004)
Service	0.1709	135,334	0.162573	49,996	-0.034***	0.002	0.002	0.009**
	(0.376)		(0.369)		(0.003)	(0.004)	(0.003)	(0.004)
Manufacturing	0.0350	135,334	0.0337627	49,996	0.001	0.003	-0.001	-0.002
	(0.184)		(0.181)		(0.002)	(0.002)	(0.002)	(0.002)
Mining	0.0239	135,334	0.0206617	49,996	0.004***	0.001	-0.002	-0.003
	(0.153)		(0.142)		(0.001)	(0.002)	(0.001)	(0.002)
Formal employment	0.3250	67,080	0.3297112	24,203	-0.086***	-0.031***	-0.004	-0.001
	(0.468)		(0.470)		(0.006)	(0.008)	(0.006)	(0.009)
Weekly work-hours	20.7133	135,334	20.60379	49,996	-1.118***	1.157***	0.095	0.208
	(25.311)		(25.176)		(0.212)	(0.271)	(0.217)	(0.315)
Outside the labor force	0.4775	135,328	0.4981198	49,994	0.024***	0.006	0	-0.004
	(0.499)		(0.500)		(0.004)	(0.005)	(0.004)	(0.006)
Working	0.4957	135,334	0.4840987	49,996	-0.023***	-0.006	0.000	0.004
	(0.500)		(0.500)		(0.004)	(0.005)	(0.004)	(0.006)
Receive economic support	0.282	135,334	0.291	32,082	-0.101***	-0.087***	-0.002	0.012
	(0.450)		(0.454)		(0.006)	(0.011)	(0.008)	(0.013)
Age	34.586	135,261	34.085	49949	-0.042		-0.028	
	(17.163)		(17.163)		(0.147)		(0.089)	
Male	0.481	135,334	0.482	49996	0.000		-0.001	
	(0.500)		(0.500)		(0.004)		(0.002)	
Married	0.409	135,334	0.423	49996	-0.013***		0.000	
	(0.492)		(0.492)		(0.004)		(0.004)	

Each of the estimates in columns (5)-(8) represent the outcome of one OLS regression. Controls include municipality times year fixed effects, age, gender, marital status, elevation, and crop suitability to sorghum, cacao, maize, and banana. Robust standard errors in parentheses. $*p < .1, **p < .05, ***p < .01$ The number of observations in column (7) and (8) is 669.

Table A.3: Estimated effect on work income, all periods from 2005q1-2015q4

|	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Categorical income [0;1]				
Inside*post	-0.0487**	-0.0501***	-0.0370**	-0.0351***				
	(0.019)	(0.017)	(0.015)	(0.012)				
Distance*post					0.0177*	0.0322***	0.0263***	0.0241***
					(0.009)	(0.010)	(0.008)	(0.007)
Age			0.0255***	0.0236***			0.0255***	0.0236***
			(0.001)	(0.001)			(0.001)	(0.001)
Age squared			-0.000281***	-0.000245***			-0.000281***	-0.000245***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.220***	0.213***			0.220***	0.213***
			(0.003)	(0.003)			(0.003)	(0.003)
Married			0.00886***	0.00242			0.00892***	0.00247
			(0.003)	(0.002)			(0.003)	(0.002)
Years of schooling				-0.000762				-0.000760
				(0.001)				(0.001)
Years of schooling squared				0.000952***				0.000952***
				(0.000)				(0.000)
Adj. R^2	0.0303	0.0311	0.278	0.314	0.0302	0.0311	0.278	0.314
N	189029	185418	185418	185344	189029	185418	185418	185344
Mean DV	0.210	0.211	0.211	0.211	0.210	0.211	0.211	0.211

OLS estimates. All specifications include locality, quarter, and municipality*year fixed effects. Robust standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

Figure A.1: Estimated effect on work income by log distance to the flood
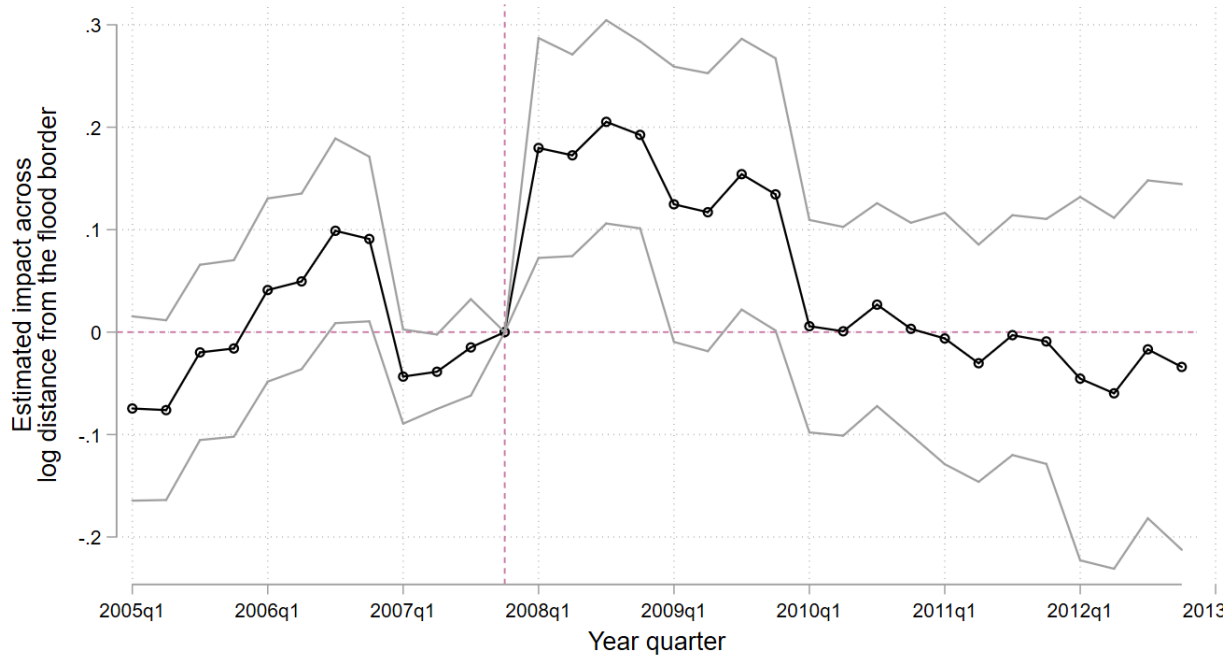
OLS estimate. This graph reports the estimated effect on work income by log distance to the most affected locality. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. N = 129,815, Clusters = 261, Adj. R^2 = 0.29

Figure A.2: Estimated effect on work income by being inside the flooded area or not
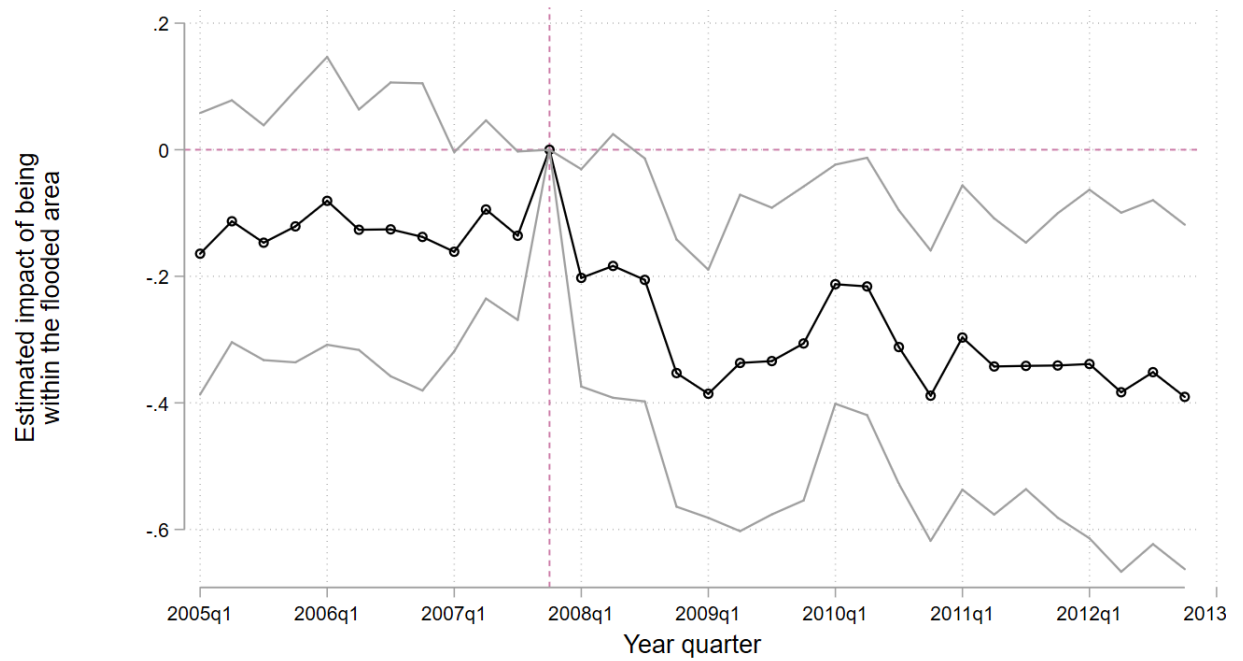
OLS estimate. This graph reports the estimated effect on work income by log distance to the most affected locality. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. N = 131,068, Clusters = 261, Adj. R^2 = 0.29

Figure A.3: Estimated effect on work income by log distance to the flood
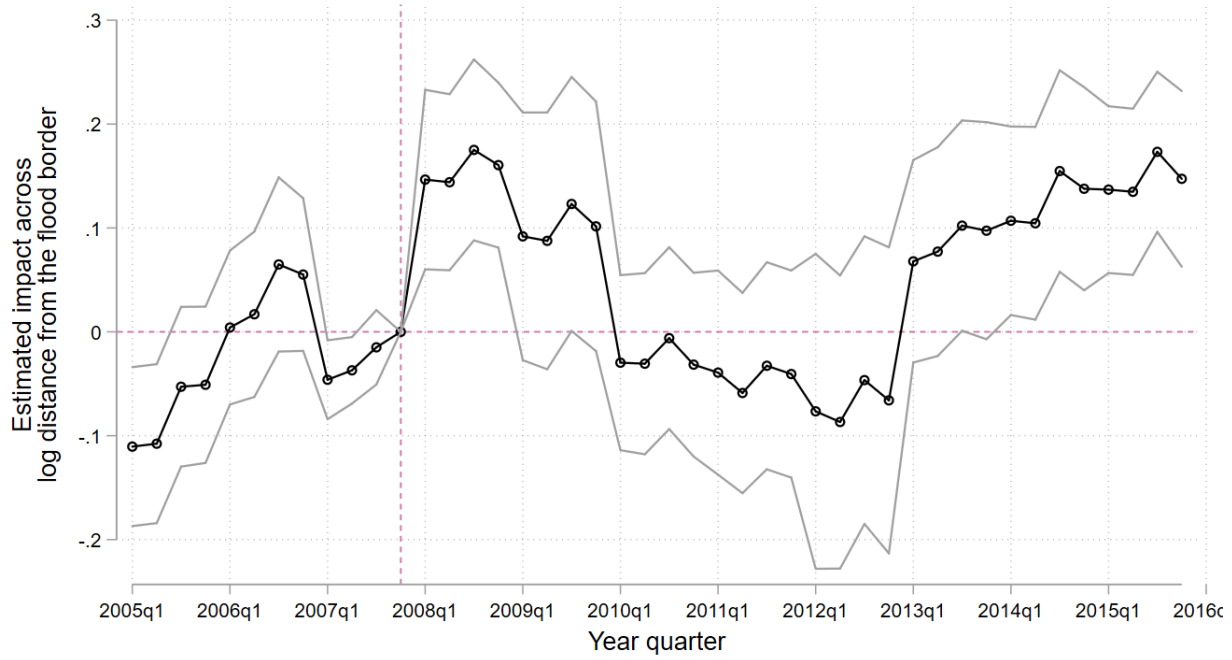
OLS estimate. This graph reports the estimated effect on work income by log distance to the most affected locality. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. N = 186,670, Clusters = 261, Adj. R^2 = 0.28

Figure A.4: Estimated effect on work income by being inside the flooded area or not
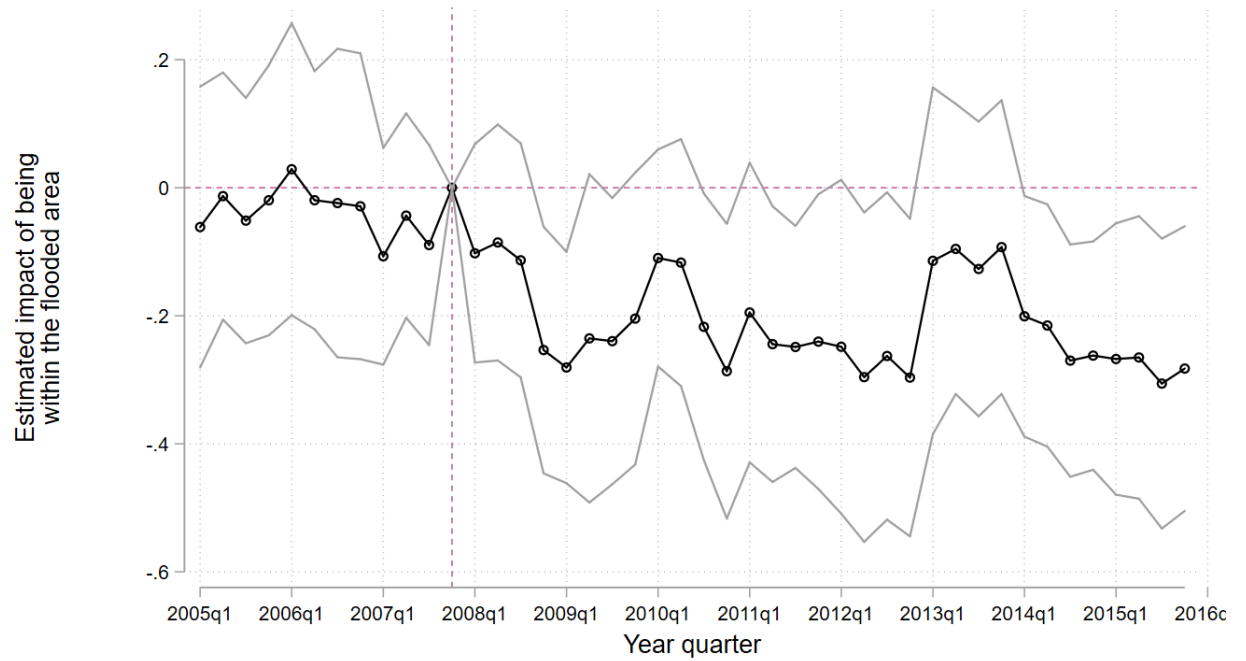
OLS estimate. This graph reports the estimated effect on work income by log distance to the most affected locality. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. N = 186,670, Clusters = 261, Adj. R^2 = 0.28

Table A.4: Effect on work income with municipality clusters

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Categorical income [0;1]				
Inside*post	-0.0469**	-0.0473**	-0.0334**	-0.0329**				
	(0.022)	(0.020)	(0.015)	(0.013)				
Distance*post					0.0179***	0.0304***	0.0220*	0.0211**
					(0.003)	(0.010)	(0.012)	(0.009)
Age			0.0253***	0.0236***			0.0253***	0.0236***
			(0.001)	(0.001)			(0.001)	(0.001)
Age squared			-0.000278***	-0.000245***			-0.000278***	-0.000245***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.225***	0.216***			0.225***	0.216***
			(0.007)	(0.006)			(0.007)	(0.006)
Married			0.0146***	0.00742**			0.0146***	0.00748**
			(0.003)	(0.003)			(0.003)	(0.003)
Years of schooling				-0.000897				-0.000896
				(0.001)				(0.001)
Years of schooling squared				0.000980***				0.000980***
				(0.000)				(0.000)
ar2	0.0339	0.0349	0.287	0.324	0.0338	0.0350	0.287	0.324
N	133308	129815	129815	129757	133308	129815	129815	129757

OLS estimates. All specifications include locality, quarter, and municipality*year fixed effects. Robust standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

Figure A.5: Estimated differences across being inside or outside the flood border, relative to 2007q4
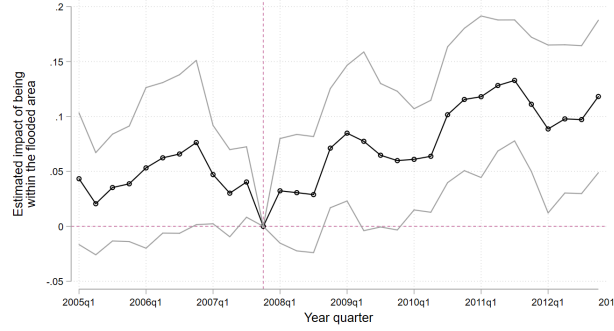
(a) The share of the population earning zero income   (b) Effect on the strictly positive income
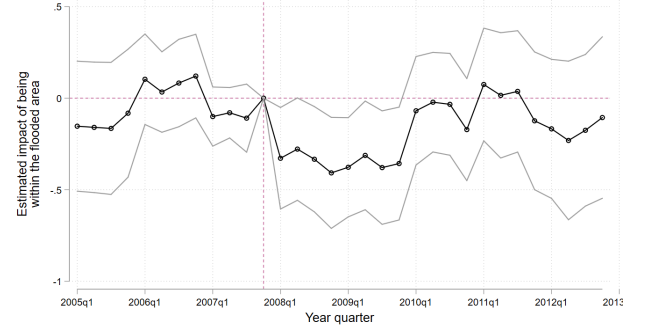
OLS estimates. Panel (a) reports the estimated effect on the share of the population earning zero income by being inside the flooded area or not, and panel (b) the effect on those earning a strict positive income. From estimating equation (2) the included covariates are locality, municipality*year and quarter fixed effects, age, age squared, gender, marital status, and latitude, longitude, elevation, and crop suitability interacted with a year dummy. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality. Panel (a): N = 131,068, Clusters = 261, Adj. R^2 = 0.29. Panel (b) N = 51,497, Clusters = 159, Adj. R^2 = 0.25

Table A.5: Effect on work income, working age population

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Categorical income [0;1]				
Inside*post	-0.0570***	-0.0559***	-0.0384**	-0.0408***				
	(0.021)	(0.018)	(0.016)	(0.014)				
Distance*post					0.0174*	0.0280**	0.0220**	0.0221**
					(0.010)	(0.012)	(0.010)	(0.009)
Age			0.0369***	0.0342***			0.0369***	0.0342***
			(0.002)	(0.002)			(0.002)	(0.002)
Age squared			-0.000447***	-0.000391***			-0.000447***	-0.000391***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.256***	0.246***			0.256***	0.246***
			(0.005)	(0.004)			(0.005)	(0.004)
Married			0.0110***	0.00444			0.0111***	0.00453
			(0.003)	(0.003)			(0.003)	(0.003)
Years of schooling				0.000579				0.000585
				(0.001)				(0.001)
Years of schooling squared				0.000846***				0.000846***
				(0.000)				(0.000)
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.0374	0.0386	0.283	0.314	0.0371	0.0385	0.283	0.314
N	112175	109359	109359	109330	112175	109359	109359	109330

OLS estimates. All estimations include locality quarter, municipality*year fixed effects. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Table A.6: Effect on work income, continuous income measure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Log monthly income				
Inside*post	-1.332***	-1.257***	-0.772***	-0.745***				
	(0.445)	(0.464)	(0.283)	(0.281)				
Distance*post					0.672***	0.707***	0.348*	0.340*
					(0.247)	(0.269)	(0.182)	(0.181)
Age			0.962***	0.956***			0.962***	0.956***
			(0.022)	(0.020)			(0.022)	(0.020)
Age squared			-0.0100***	-0.00989***			-0.0100***	-0.00989***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			3.164***	3.150***			3.165***	3.151***
			(0.149)	(0.147)			(0.149)	(0.147)
Married			0.291***	0.242***			0.291***	0.242***
			(0.089)	(0.086)			(0.089)	(0.085)
Years of schooling				0.109***				0.109***
				(0.039)				(0.039)
Years of schooling squared				-0.00246				-0.00247
				(0.002)				(0.002)
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.0207	0.0218	0.430	0.432	0.0206	0.0218	0.430	0.432
N	97042	94631	94631	94595	97042	94631	94631	94595

OLS estimates. All specifications include locality, quarter, and municipality*year fixed effects. Standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

Table A.7: Effect on work income, distance to Villahermosa

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Categorical income [0;1]							
Inside*post	-0.0447**	-0.0502***	-0.0362**	-0.0353***				
	(0.018)	(0.017)	(0.015)	(0.012)				
Distance*post					0.0167*	0.0333***	0.0242**	0.0226***
					(0.009)	(0.013)	(0.010)	(0.008)
Age			0.0253***	0.0236***			0.0253***	0.0236***
			(0.001)	(0.001)			(0.001)	(0.001)
Age squared			-0.000278***	-0.000245***			-0.000278***	-0.000245***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.225***	0.216***			0.225***	0.216***
			(0.004)	(0.004)			(0.004)	(0.004)
Married			0.0146***	0.00743***			0.0146***	0.00749***
			(0.003)	(0.003)			(0.003)	(0.003)
Years of schooling				-0.000879				-0.000880
				(0.001)				(0.001)
Years of schooling squared				0.000979***				0.000979***
				(0.000)				(0.000)
Distance to Villahermosa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.0340	0.0350	0.287	0.324	0.0338	0.0350	0.287	0.324
N	133308	129815	129815	129757	133308	129815	129815	129757

OLS estimates. All estimations include locality quarter, municipality*year fixed effects. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Table A.8: Effect on work income, distance to closest main river

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Dependent variable: Categorical income [0;1]					
Inside*post	-0.0440**	-0.0498***	-0.0360**	-0.0354***				
	(0.018)	(0.016)	(0.014)	(0.011)				
Distance*post					0.0154*	0.0325**	0.0239**	0.0221**
					(0.008)	(0.012)	(0.010)	(0.009)
Age			0.0253***	0.0236***			0.0253***	0.0236***
			(0.001)	(0.001)			(0.001)	(0.001)
Age squared			-0.000278***	-0.000245***			-0.000278***	-0.000245***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.225***	0.216***			0.225***	0.216***
			(0.004)	(0.004)			(0.004)	(0.004)
Married			0.0146***	0.00742***			0.0146***	0.00748***
			(0.003)	(0.003)			(0.003)	(0.003)
Years of schooling				-0.000881				-0.000881
				(0.001)				(0.001)
Years of schooling squared				0.000979***				0.000979***
				(0.000)				(0.000)
Distance to closest main river	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Adj. R^2	0.0340	0.0350	0.287	0.324	0.0339	0.0350	0.287	0.324
N	133308	129815	129815	129757	133308	129815	129815	129757

OLS estimates. All estimations include locality quarter, municipality*year fixed effects. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Table A.9: Effect on work income, Conley standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Categorical income [0;1]				
Inside*post	-0.0423***	-0.0453***	-0.0319***	-0.0358***				
	(0.007)	(0.009)	(0.008)	(0.008)				
Distance*post					0.0179***	0.0260***	0.0181***	0.0176***
					(0.006)	(0.007)	(0.007)	(0.006)
Age			0.0263***	0.0244***			0.0263***	0.0244***
			(0.000)	(0.000)			(0.000)	(0.000)
Age squared			-0.000289***	-0.000254***			-0.000289***	-0.000254***
			(0.000)	(0.000)			(0.000)	(0.000)
Male			0.224***	0.215***			0.224***	0.216***
			(0.002)	(0.002)			(0.002)	(0.002)
Married			0.0121***	0.00422**			0.0121***	0.00427**
			(0.002)	(0.002)			(0.002)	(0.002)
Years of schooling				-0.000787				-0.000787
				(0.001)				(0.001)
Years of schooling squared				0.000973***				0.000973***
				(0.000)				(0.000)
Coordinates	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Crop suitability	No	Yes	Yes	Yes	No	Yes	Yes	Yes
N	133308	129815	129815	129757	133308	129815	129815	129757

OLS estimates. Conley Standard errors in parentheses. All estimations include locality quarter, municipality*year fixed effects. Results obtained using stata codes provided by Hsiang (2010). The small differences in point estimates are due to weights not allowed. $*p < .1, **p < .05, ***p < .01$

Table A.10: Heterogeneous effects on categorical work income

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Categorical income [0;1]					
Inside*post	-0.0330**	-0.0329**	-0.0353**	-0.0334***	-0.0327**	-0.0337***
	(0.014)	(0.015)	(0.015)	(0.011)	(0.014)	(0.012)
Agricultural	-0.0208**					
	(0.008)					
Agricultural*Affected	0.00139					
	(0.013)					
Construction		0.233***				
		(0.010)				
Construction*Affected		-0.00435				
		(0.014)				
Retail			0.146***			
			(0.006)			
Retail*Affected			0.0141			
			(0.013)			
Service				0.259***		
				(0.006)		
Service*Affected				0.00539		
				(0.014)		
Manufacturing					0.115***	
					(0.007)	
Manufacturing*Affected					0.0182	
					(0.013)	
Mining						0.461***
						(0.013)
Mining*Affected						-0.0351
						(0.023)
Adj. R^2	0.288	0.308	0.304	0.376	0.292	0.327
N	129815	129815	129815	129815	129815	129815

OLS estimates. All estimations include locality quarter, municipality*year fixed effects, and baseline controls. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Figure A.6: Estimated differences in sector of employment by distance to the flood border relative to 2007q4
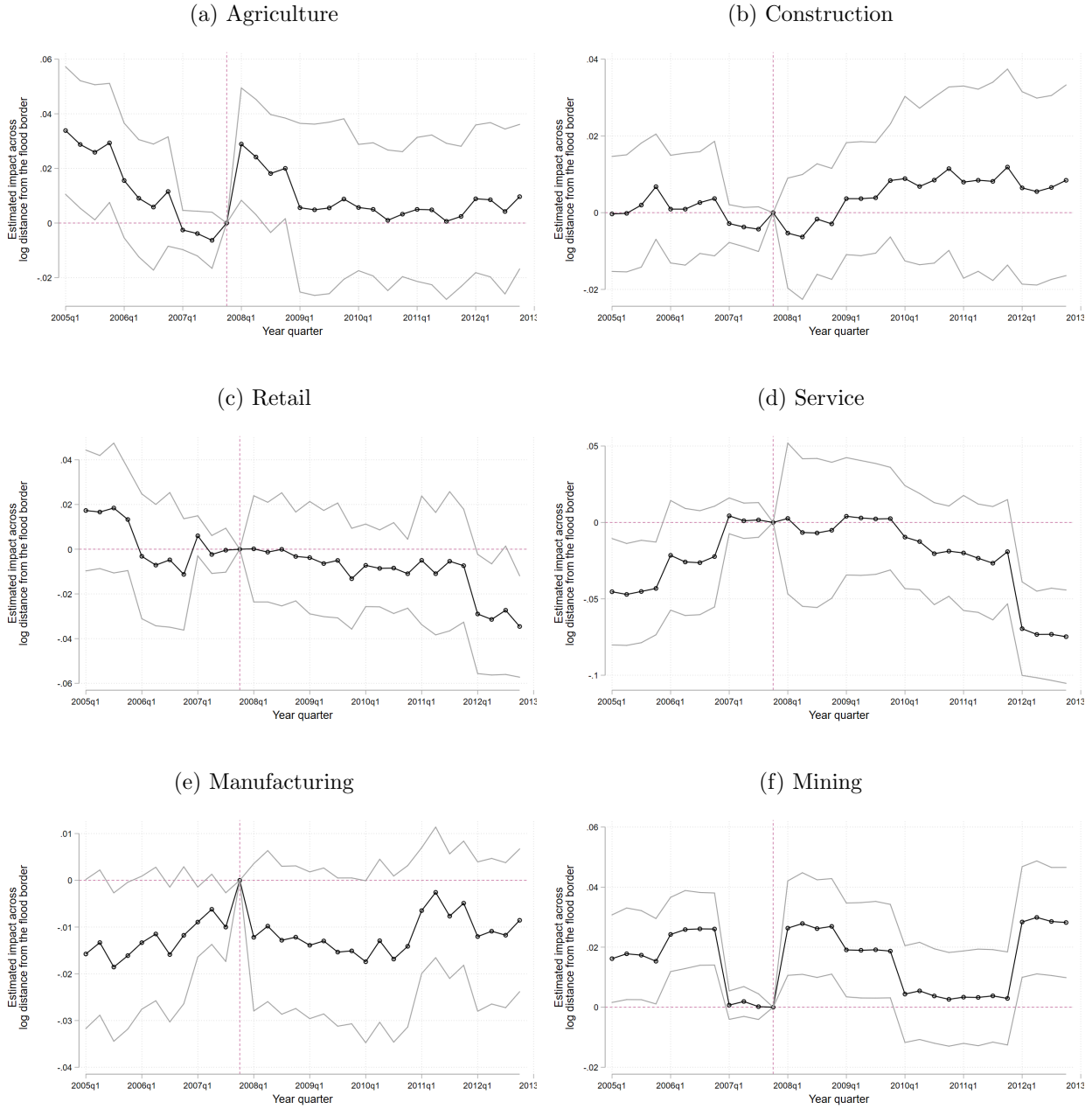
(a) Agriculture

(b) Construction

(c) Retail

(d) Service

(e) Manufacturing

(f) Mining

Notes: OLS estimates. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality.

Figure A.7: Estimated differences in sector of employment by being inside the flood border or not relative to 2007q4
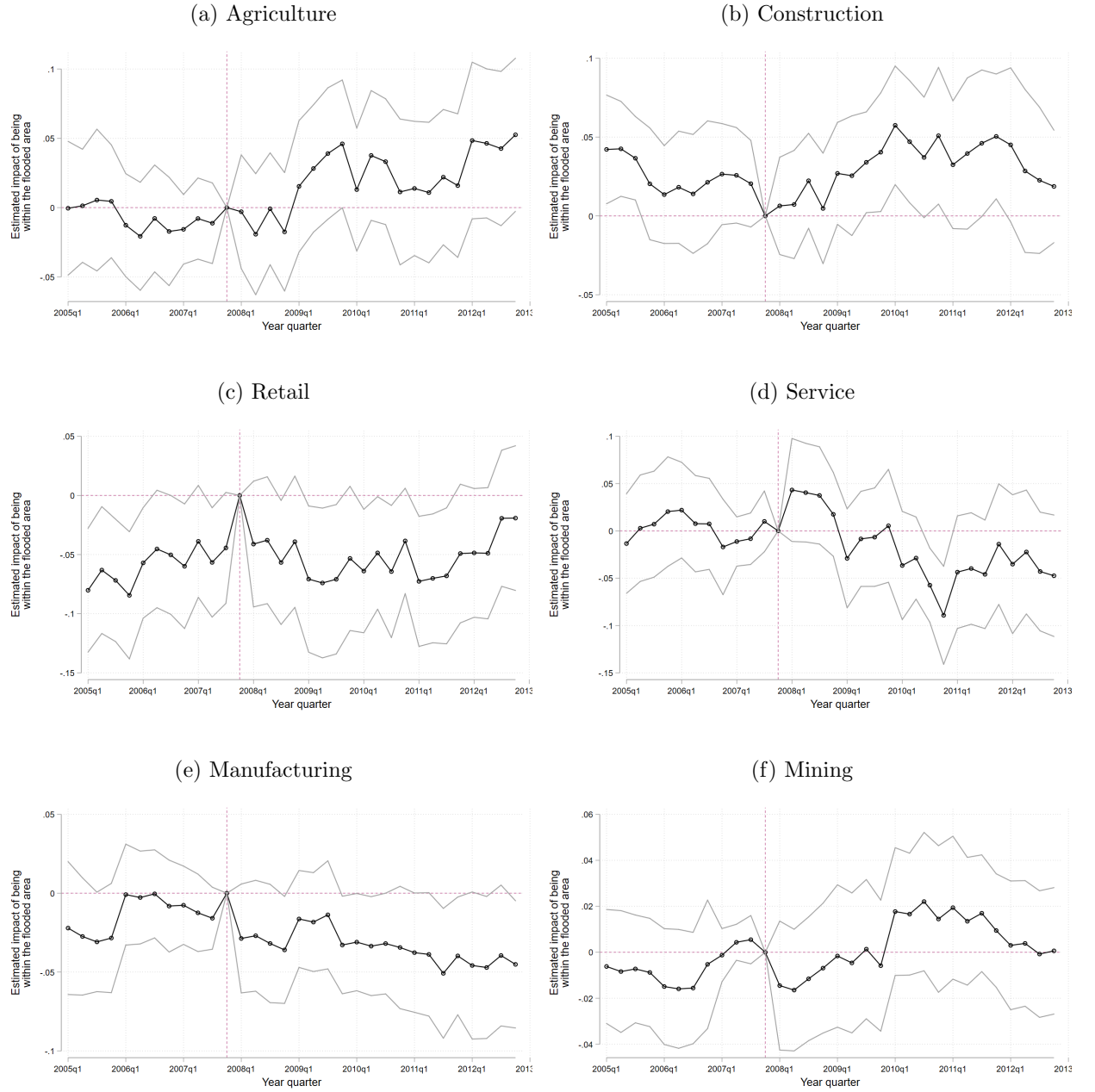
(a) Agriculture

(b) Construction

(c) Retail

(d) Service

(e) Manufacturing

(f) Mining

Notes: OLS estimates. All baseline controls are included. The gray lines indicate the 95 percent confidence interval based on robust standard errors clustered by locality.

Table A.11: Differences in demographic characteristics after the flood

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Age	Male	Years of schooling	Married	Age	Male	Years of schooling	Married
Distance*post	-0.239	0.0105	0.184	-0.00172				
	(0.501)	(0.010)	(0.156)	(0.023)				
Inside*post					0.773	-0.0310**	-0.288	-0.0353
					(0.937)	(0.013)	(0.246)	(0.029)
Adj. R^2	0.0189	0.00235	0.116	0.0183	0.0190	0.00237	0.116	0.0183
N	131807	131807	131743	131807	131807	131807	131743	131807
Mean DV	34.58	0.483	7.773	0.411	34.58	0.483	7.773	0.411

OLS estimates. All estimations include locality, quarter, and municipality, crop suitability, and elevation times year fixed effects

Standard errors in parentheses

$*p < .1, **p < .05, ***p < .01$

Table A.12: Differences in income across distances and samples

	(1)	(2)	(3)	(4)
	Categorical income	Zero income	Categorical income	Zero income
	Localities outside the flooded area		Localities inside the flooded area	
Distance*post	-0.0119	-0.00766	0.0170**	-0.0373***
	(0.019)	(0.021)	(0.007)	(0.011)
Adj. R^2	0.287	0.293	0.283	0.267
N	90369	90369	39446	39446
Mean DV	0.201	0.618	0.241	0.593

OLS estimates. All estimations include locality quarter, municipality*year fixed effects, and baseline controls. Robust standard errors in parentheses $*p < .1, **p < .05, ***p < .01$

Figure A.8: Stable night lights in Tabasco

(a) 2006

(b) 2007

(c) 2008
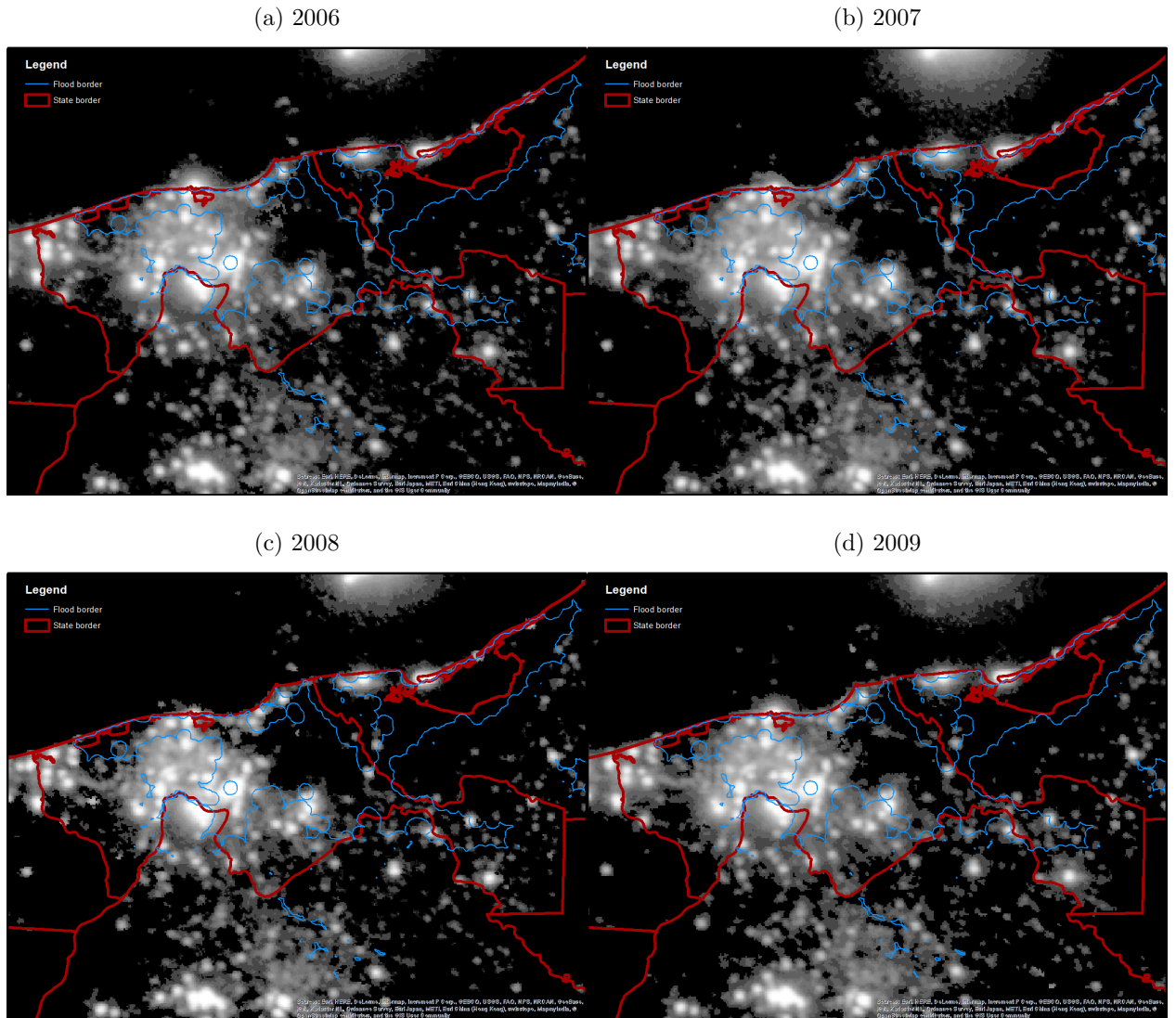
(d) 2009

Source: NOAA NGDC. The maps display yearly night light intensity across the state of Tabasco for the years 2006, 2007, 2008, and 2009. On a scale from zero to 63 the more light colors represent a higher night light intensity. Despite the severe flood in 2007 there are no visible differences in yearly night light intensity in the years 2007 and 2008.

Figure A.9: State government spending at municipality level across affected and unaffected municipalities. 2005=100

Source: Sistema Estatal y Municipal de Bases de Datos (SIMBAD) - INEGI

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Figure A.9a: Yearly spatial distribution of localities across Tabasco 2005-2010

(e) 2005   (f) 2006

(g) 2007   (h) 2008

(i) 2009   (j) 2010
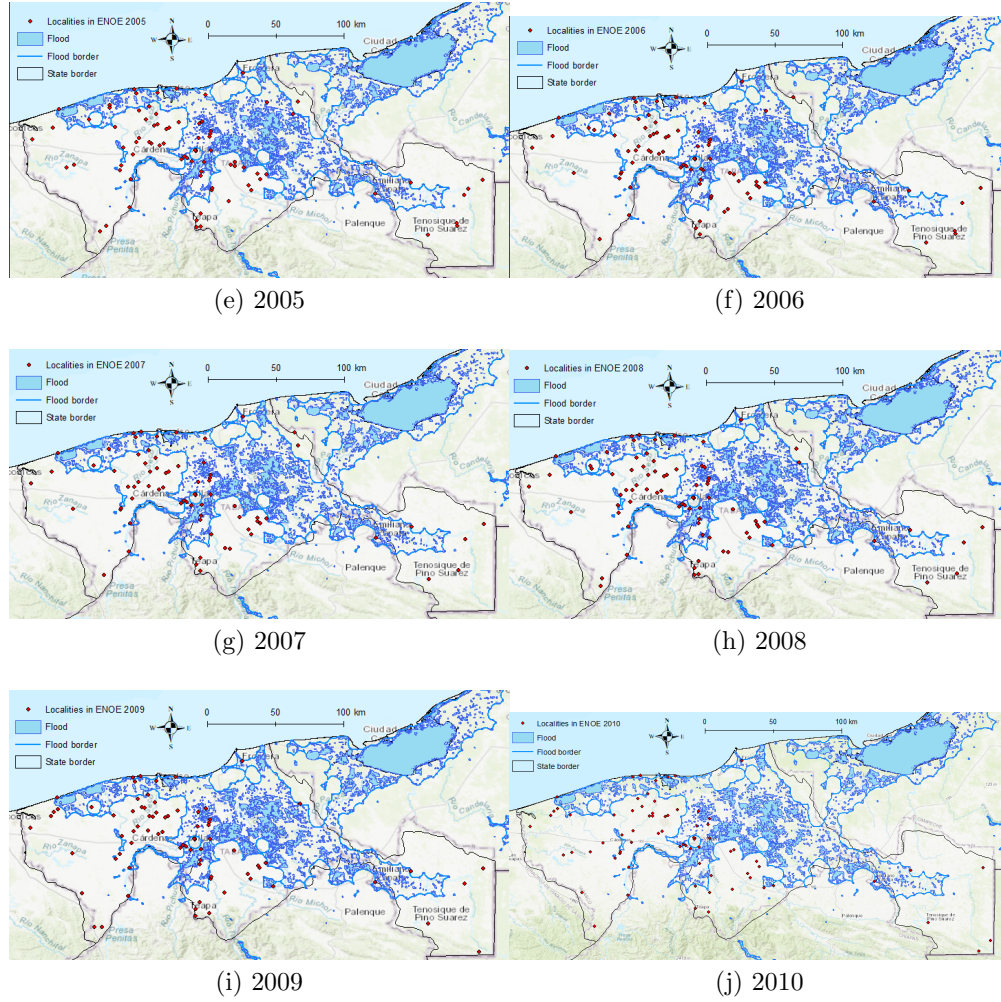
Figure A.9b: Yearly spatial distribution of localities across Tabasco 2011-2014

(k) 2011

(l) 2012

(m) 2013

(n) 2014
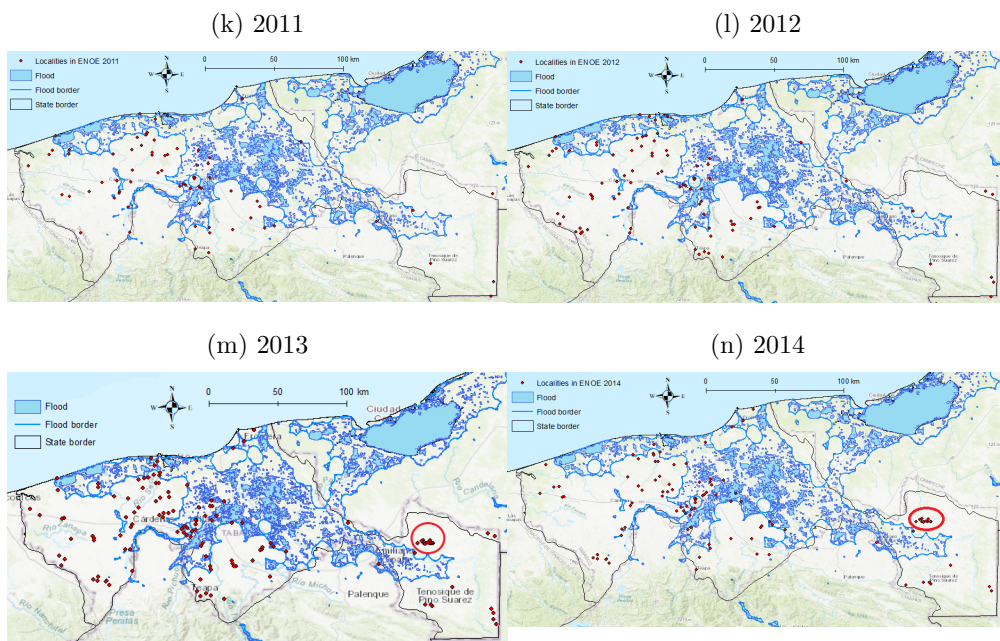
The maps depict Tabasco including the 2007 flood. The red dots represent localities included in the ENOE in the specific year, and the red circles in the two last pictures highlight the additional 13 localities changing the spatial representativeness of the data.

Chapter 2

Politics and Religion:

Effects of the Faith-Based Initiatives in the US 1996-2010

Jeanet Sinding Bentzen and Lena Lindbjerg Sperling

Politics and Religion:

Effects of the Faith-Based Initiatives in the US 1996-2010

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Abstract

Are religious beliefs influenced by policy? The faith-based initiatives are a series of reforms with the purpose of strengthening the ties between government officials and religious groups, increasing religious groups' access to public funds, and decreasing the constraints on these organizations' religiosity. We utilize the different uptake of the initiatives over the period 1996-2010 across US states in a diff-in-diff setup. We find that religious attendance, beliefs, and the number of religious non-profits increased in states that passed one or more faith-based initiatives. States do not differ in terms of changes in religiosity or potentially important confounders prior to the reforms. The results hold when restricting the analysis to pairs of counties along state borders and when comparing to a synthetic control group. The results point to strengthened ties between state and church as one explanation for the continued high religiosity levels in many US states.

"I contemplate with sovereign reverence that act of the whole American people which declared that their legislature should make no law respecting an establishment of religion, or prohibiting the free exercise thereof, thus building a wall of separation between Church and State." Thomas Jefferson, letter on January, 1802.

"I understand in the past, some in government have said government cannot stand side by side with people of faith. I viewed this as not only bad social policy — I viewed it as discrimination." George W. Bush, speech, June 2004, cited by Sager (2010).

1   Introduction

While religious participation has declined in many parts of the World, the United States stands out as a Western country, where religious participation has remained comparatively high.[1] A quarter of the US population attend religious services on a weekly basis and more than eight out of ten Americans believe in an afterlife. At the same time, religion plays a central role in US politics with most politicians being affiliated with a religious denomination, frequently discussing their religion when campaigning, and many churches and religious figures being highly politically active. We investigate whether the ties between religion and politics may be one determinant of differences in religiosity across US states. There has been little work investigating this link, but understanding this nexus of the political and religious domains is crucial for drawing normative conclusions about these policies.

We pose a simple test of whether strengthened ties between religion and politics increases churchgoing and religious beliefs: The introduction of the faith-based initiatives.[2] These initiatives included three major groups of legislative changes and policies regarding faith-based organizations.[3] First, the initiatives were meant to increase provision of public welfare by faith-based organizations. This part of the initiatives has been highly criticized since not much money ended up on the church budgets. Second, the initiatives reduced government regulations of all faith-based organizations. Third, the initiatives aimed to strengthen the ties between govern-

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[1]Voas & Chaves (2016), Iannaccone (1998).

[2]What we term "faith-based initiatives" include the Charitable Choice provision and the later faith-based initiatives.

[3]Faith-based organizations include religious organizations (churches, mosques, synagogues, or temples), organizations sponsored by a religious organization, or non-profit organizations with a clearly stated religious motivation (https://www.nationalservice.gov/).

ment officials and faith-based organizations.[4] Some scholars argue that the latter is the largest part of the faith-based initiatives (Sager (2010)). The political idea was to secure religious freedom and to exploit the idea that churches provide better for the needy than the state.

The first faith-based initiatives were implemented in 1996. Later, other states followed suit and today most states have implemented one or more initiative. We exploit the different take-up and intensity of the initiatives across states to investigate the impact of the legislative changes on religious participation and beliefs. To measure religiosity, we use data from the General Social Survey (GSS), which includes information on socio-economic and demographic characteristics, as well as cultural values and beliefs of the US population since 1972. Our sample period 1980-2010 covers 45,009 individuals. We find that the faith-based initiatives increased participation at religious services, but also strength of religious affiliation, intensity of prayer, beliefs in God, and beliefs that the Bible reflects the word of God. The results are robust to including state and year fixed effects and various controls at the individual and state level.

One main concern is that the decision to adopt faith-based initiative is not an exogenous process. Indeed, it turns out that states with lower attendance rates implemented the policies earlier than others, perhaps due to fear of secularization. Since we estimate changes within states, these differences in levels are no threat to our identification strategy. Instead, we show that states were not systematically different in terms of *changes* in religious participation, beliefs or other potentially important confounders prior to the legislative changes. Furthermore, adding controls for observed factors that potentially influence the differences in take-up, does not alter results. We reduce the likelihood of unobserved differences within states in two different ways: By comparing only counties in pairs on each side of a common state-border and by comparing the counterfactual development in religiosity to actual religiosity in treated states using the method of synthetic controls. The result remains: Religious attendance and beliefs increase in the aftermath of the faith-based initiatives.

The estimated effects are sizeable. Average religious participation increased with 2.8 pct points more in states after the faith-based initiatives, compared to states that had not yet implemented the initiatives. Average religious participation in the US has fallen with 1.3 pct points over the same 20 years. To illustrate our findings, we split states into two equally sized

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[4]Chaves (1999) and Sager (2010)

groups, depending on the year of first faith-based initiative. Figure 1 shows that average church attendance fell slightly in the beginning of the period for all states. But around 1996, church attendance began to increase in states that implemented faith-based initiatives earlier than the median. The decline in church attendance continued in the remaining states.[5]

Figure 1: Average church attendance depending on timing of implementation
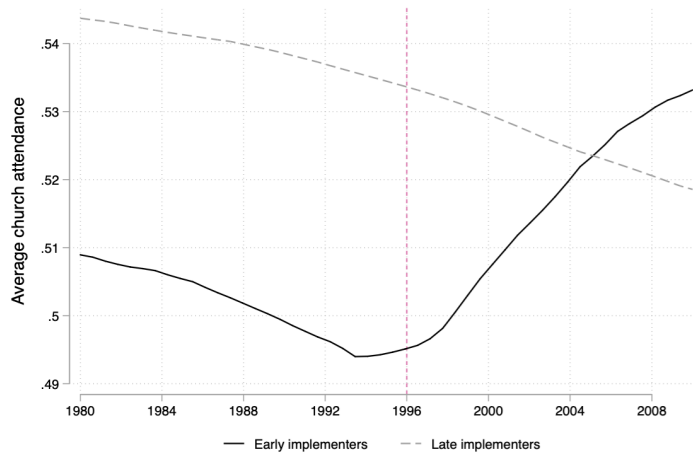
Note: The sample is split into two equally sized groups, depending on the year of the first faith-based initiative. The lines represent the kernel-weighted local polynomial regression of the weighted state means of attendance rates.

The impact of legislative changes on attendance and beliefs is homogeneous across the four major regions of the US, but not across types of individuals. The poor are more likely to respond to the legislative changes with increased churchgoing, which corresponds well to the logic that the welfare provisions were mainly for the poor. Religious beliefs, however, increased for all income groups. This indicates that the faith-based initiatives brought with them more than welfare funding. We investigate different explanations. First, when more people go to church, chances are that some of them will end up agreeing with the ideas spread by the church and self-identify as being more religious. In a similar manner, religious missions often spread material goods, education, and health care, but often had an additional goal: Religious conversions. In his history of Christian missions, Robinson (1915) explains how building schools and hospitals was by far the most effective way for missionaries to convert locals to Christian-

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[5]A similar picture emerges if one instead splits the states into above and below median number of faith-based initiatives (Appendix Figure A.1). We have re-scaled the original attendance variable from the GSS to lie between 0 and 1 to ease interpretation of regression results. An average church attendance rate of 0.5 amounts to attendance once a month, while 0.62 amounts to attending 2-3 times a month.

ity. Bryan *et al.* (2018) partnered with an evangelical Protestant anti-poverty organization to randomly offer poor households in the Philippines an education program based on "theology and values". Six months after the program, they found significant increases in religiosity and income, but no significant changes in total labor supply, assets, consumption, food security, or life satisfaction. Across individuals in Africa, Nunn (2010) finds that descendants of ethnic groups that experienced greater missionary contact are more likely to self-identify as Christian today.

By reducing the amount of regulations that religious organizations face and by increasing their access to government funds, the initiatives increased the benefits from establishing and maintaining religious organizations. In support, we find that the laws increased the number of congregations and non-profit organizations more generally.

Last, the faith-based initiatives may also influence religious beliefs and churching through a non-monetary part. The majority of the initiatives do not involve much money, but rather laws, policies, and practices that tie religious groups and government closer together, which according to Sager (2010) increase the amount of religion in the public sphere. This in turn may increase religious beliefs. In support, we find that the faith-based initiatives lower the share of politicians with an "unknown" religious denomination and that the effect on religiosity of symbolic laws is no different from the effect of more concrete laws providing welfare through churches.

The first faith-based initiative, Charitable Choice, was introduced as part of the 1996 welfare reform. One concern is that our results are driven by welfare changes during the 1996 welfare reform and later reforms. The results just mentioned speak to a non-monetary impact of the faith-based initiatives, which is difficult to relate to the welfare reform. Furthermore, the 1996 reform was introduced at the federal level. Nevertheless, one could imagine different effects at the state level. Our results are robust to controlling for state-level public spending and the impact of faith-based initiatives does not vary with public spending.[6]

Another concern is that increased government benefits to faith-based organizations could crowd out private donations (Gruber & Hungerman (2007)). We do not find evidence for this.

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[6]A related concern is that the 1996 welfare reform influenced some individuals more than others and that this group of individuals drives the results. This group of individuals could be foreign borns according to results by Hungerman (2005). Our results are robust to controlling for foreign borns and the impact of legislative changes on church attendance and religious beliefs is not larger for foreign borns.

If anything, private donations to faith-based organizations increase, albeit not significantly.

Last, if faith-based organizations are more efficient in providing welfare services as suggested by proponents of the faith-based initiatives and the initiatives actually increase this provision, we expect increased well-being of affected individuals. At the state level, we find no impact of the laws on poverty rates, general public welfare, health, death rates by drugs or alcohol, or violent crimes. At the individual level, we find no effects on hours worked, income, education, or feelings of life satisfaction. The initiatives increase the likelihood of being employed, but also the likelihood of being unhappy. These weak results on well-being could also be due to the rather small budgets provided by the faith-based initiatives.

2   Additional Related Research

Other research has attempted to explain differences in religious attendance and beliefs across the globe, and across US states in particular. These attempts can be divided into supply and demand side explanations.

A widely used model to investigate the supply side of the religious market was proposed by Azzi & Ehrenberg (1975). Individuals allocate their time and goods among religious and secular commodities to maximize their lifetime and afterlife utility.[7] One group of explanations is based on the observation that a deregulation of churches in the US began in the 19th century, which increased the supply of different religions (Finke & Stark (2005)). This increased variety of religions improved the potential match-rate between follower and type of religion, which might explain higher US churchgoing compared to its' European counterparts with their highly regulated state religions and much lower attendance rates. There are also reasons to believe that the US separation by state and church, coined by Thomas Jefferson, did not disentangle religion from politics or sever relations between church and state. Buckley (1988) argues that the contrary might have been the case. He argues that the act ensured Baptists and other evangelicals an equal religious liberty and thereby allowed evangelicals to cooperate in pursuit of their legislative agenda, with which they hoped "to impose their religious values and culture upon American society." We focus on the later faith-based initiatives, which have been argued to be a particularly evangelical movement. Regardless of any potential link to evangelicalism,

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[7]See overviews of the economics of religion literature in Hungerman (2010), Iannaccone (1998), and Iyer (2016).

the initiatives can be regarded as a shock towards tightened church-state relations.

Empirical studies find that religious attendance correlates positively with plurality of religions[8] and lack of government regulation across countries in some studies.[9] However, McCleary & Barro (2006) found that the presence of an official state religion was positively associated with religiosity in a panel of 68 countries. They theorize that this may be due to the subsidies flowing to organized religion. We contribute to this literature by investigating shocks to subsidies to religion in the form of money and reduced regulation. Our study serves to identify effects of state-church cooperation within countries.

Most existing supply-side studies are correlational. One exception is a study by Gruber & Hungerman (2008) who exploit differences across states in the repeal of blue laws over the period 1955-1991 as exogenous shocks to the opportunity cost of going to church. As the opportunity cost of churchgoing increases, participation in religious activities decreases.

One dominating demand-side theory is that increased stress and uncertainty in society increases the demand for religion, which might act as a buffer against psychological or economic stress.[10] Scholars have noted the low degree of social security in the US as one potential reason for its' high religiosity compared to other Western countries. Research has found that higher religiosity is associated with less redistribution, both in terms of actual spending (across countries and across counties in the US) and in terms of preferences for redistribution (across individuals).[11] Hungerman (2005) investigates the causal effect of government spending on church attendance and charitable giving, while Scheve *et al.* (2006) and Benabou & Tirole (2006) argue for the reverse causation. One argument is that the religious have already insured themselves against adversity through religion (psychologically or materially) and will therefore be less willing to pay extra for government-provided insurance. The faith-based initiatives may have been a political substitute for social spending. In that case, our results provide an alternative explanation for the negative association between public spending and religiosity.

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[8]E.g., Voas *et al.* (2002); McCleary & Barro (2006). Early arguments by sociologists went in the opposite direction: The idea was that co-existence of many religions makes the truth of each individual religion less likely, thus weakening faith Berger (1967). Later empirics have found that this explanation does not dominate.

[9]McCleary & Barro (2006).

[10]Norris & Inglehart (2011), Bentzen (forthcoming).

[11]Hungerman (2005), Scheve *et al.* (2006), Benabou & Tirole (2006).

3 Background on the Faith-Based Initiatives

This section provides a brief overview of the history of faith-based initiatives in the US. We begin with a definition of a faith-based organization. A *faith-based organization* (FBO) is an organization whose values are based on faith and/or beliefs, which has a mission based on social values of the particular faith, and which most often draws its activists (leaders, staff, volunteers) from a particular faith group.[12] Faith-based organizations are grass-root organizations active locally but also on an international scale. Their funding comes from member donations or state or international grants.[13]

The *faith-based initiatives* are a series of reforms consisting of three main components: i) a reduction in government regulation of faith-based organizations, ii) increased access to government funds for faith-based organizations without restrictions on their faith, and iii) encourages to strengthen cooperation between state officials and faith-based organizations. The first faith-based initiative, the Charitable Choice provision, was part of the 1996 welfare reform.[14] Charitable Choice relaxed restrictions on the legal amount of religion involved in welfare provision.[15] Provision of government funding by organizations with religious roots was legal before Charitable Choice, but the government service had to be provided through a secular entity. Charitable Choice allowed faith-based organizations to provide government welfare, such as vouchers, without segregating this from religious activities. A religious organization was no longer required to "alter its form of internal governance" or "remove religious art, icons, scripture, or other symbols as a condition for contracting to deliver services".[16] The removal of regulations for faith-based organizations extended to all faith-based organizations, both publicly or privately funded. The Charitable Choice provision also allowed faith-based organizations to discriminate on faith when hiring. It was not allowed, though, to discriminate

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[12] The faith to which the organization relates to does not have to be academically classified as religion (Bielefeld & Cleveland (2013)).

[13] Ferris (2005), https://www.usaid.gov/work-usaid/partnership-opportunities/faith-based-community-organizations/faith-based-organizations, https://www.thebalancesmb.com/are-there-advantages-to-being-a-faith-based-nonprofit-2501882

[14] The 1996 welfare reform gave, among other things, more autonomy to states and local governments in the provision of social welfare (Chaves (1999), Edin & Lein (1997)). Charitable Choice was signed into law by President Bill Clinton, but was implemented primarily based on a series of executive orders issued by governor George W Bush (Sager (2010)).

[15] Chaves (1999), Wright (2009).

[16] Chaves (1999), p. 836.

against recipients of services based on their religion.[17]

Several other faith-based initiatives have followed since Charitable Choice in 1996, along the same lines. In general, "there is a continued and growing effort at the state level to increase the presence of religious groups in the social services sector by specifically encouraging their participation and by encouraging government employees to work toward the inclusion of such groups in government-funded programs" (Sager (2010), p. 36).

An example of the reduction in regulations for faith-based organizations is the Teen Challenge Bill, a program offering drug rehabilitation through Christian scripture (Sager (2010), p.37). Although the Teen Challenge did not receive government funds, it did offer treatment to drug users and therefore fell under the state's regulations. In 1995, the Texas Commission on Alcohol and Drug Abuse threatened to close down the Teen Challenge for violations of state regulations. Some argued that this was discrimination against faith, and that religious groups are better at helping those in need than the government. In 1997 the so-called Teen Challenge Bill was passed, which exempted religious treatment programs from state censure and oversight. To qualify for exemption, the program and its' proposed treatment had to be religious. Organizations offering standard medical treatment were still subdued to standard government regulations. An example of reduced regulations, which enters our dataset, is Executive Order 13199. This executive order called for eliminating "unnecessary legislative, regulatory and other bureaucratic barriers that impede effective faith-based and other community efforts to solve social problems."[18]

The other part of the faith-based initiatives was to increase faith-based organizations' access to government funds. The most common way for states to reach this goal has been to appoint a faith-based liaison (FBL), i.e. a person responsible for the communication between faith-based organizations and government officials.[19] The FBL often works from an Office of Faith-Based Initiatives (OFBCI), which was an office designed to create a positive and cooperative environment between religious groups and government officials. The purpose of the FBLs was to create a state social services system in which faith-based organizations would be more involved, to make religious groups more comfortable interacting with state agencies, and to

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[17]Sager (2010), Jacobson *et al.* (2005).
[18]Sager (2010), p. 32.
[19]Sager (2010), p. 47.

remove the barriers facing religious groups receiving government grants.[20] Ways to achieve the increased cooperation between faith-based groups and the government were to organize faith-based conferences and to create advisory boards with faith-based representatives on board.[21]

The political support for the faith-based initiatives was based on ideas of religious freedom and the idea that faith-based organizations were better at providing for the needy than their secular counterparts.[22] Proponents of the faith-based model argued that the initiatives secured religious freedom by allowing faith-based organizations to compete for federal and state money without having to give up their religious character.[23] Charitable Choice was intended to guarantee that small religious groups were not discriminated against in government funding decisions. A public opinion pole from 1999 showed that the majority of democrats, republicans, and independents believed that the social problems of the US were better solved by a closer collaboration between government and religious associations.[24] Further, supporters of the initiatives argue that they have been beneficial insofar as they brought the faith-based voice back into the public square.[25]

State governments were not required to adapt policies supporting the faith-based initiatives, as long as they did not directly discriminate against religious organizations (Sager (2010)). Implementation across states therefore varies in terms of timing and extent. For the main analysis, we rely on data collected by Sager (2010) on the timing and number of legislative changes and executive orders between 1996 and 2009 related to Charitable Choice or the following faith-based initiatives.[26] The data source is the legal database LexisNexis, which is the world's largest electronic database for legal and public records related information. Sager retrieved the relevant legislative changes by using search words such as "charitable choice" and "faith-based".[27] We show robustness of the results using alternative measures of the extent of faith-based initiatives, based on interviews conducted by Sager (2010). These measure the timing of establishment of faith-based liaisons and offices of faith-based initiatives (Appendix Table A.24).

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[20]Loconte (2002); Sherman (1999)

[21]Ragan *et al.* (2003); Sager (2010).

[22]Carlson-Thies (1999); Cnaan & Boddie (2002); Sherwood (2000)

[23]Chaves (1999); Sager (2010); Formicola *et al.* (2003); Monsma (2000)

[24]U.S. General Accounting Office (2002), Carlson-Thies (2001).

[25]Sager (2010)

[26]A literature discusses the political implementation of the initiatives at the federal level. Our analysis includes time fixed effects throughout in order to focus attention on what happens at the state level.

[27]For further details on the data collection, see Appendix A.1.

Table 1 shows the legislative changes divided into different types. The first type is laws making faith-based programs available, of which the most frequent program is prison wards. Next comes concrete legislative changes facilitating government access for faith-based organizations. An example of these could be including a member from the religious community on advisory boards. The most common legislative changes are so-called symbolic laws. Most common among those is encouraging faith-based organizations to partner with the government.

Table 1: Number of faith-based initiatives by type

Faith Based Program	**45**
Prison	30
Youth/School	6
Drug/alcohol	9
Concrete laws	**136**
Rep. at agency advisory board	70
Appropriations to FBOs	58
Exempt FBOs from standard regulations	6
Assist with grant writing process	2
Symbolic laws	**151**
Office of Faith Based Initiative	11
Encourage partnering with FBOs	132
Faith based advisory board	8
Total	**332**

The faith-based initiatives have been criticized for not being supported by the amount of money initially promised. Instead, scholars have argued that the vast majority of the faith-based initiatives consisted of laws, policies, and practices that involved changing government culture and creating a new "faith-based bureaucracy" that links state governments and religious organizations and legitimizes a new role for religion within politics.[28] This is supported by the observation that the largest group of the laws in Table 1 were laws that "Encourage partnering with FBOs". We will investigate whether the impact of the laws differ depending on the type of laws (Appendix Table A.13) and whether the relgiosity of government officials has changed in the aftermath of the faith-based initiatives (Appendix Table 9).

Figure 2 shows the sum of states that implemented at least one faith-based initiative over time.[29] The states gradually implemented faith-based initiatives over the years, until 44 states

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[28]Lindsay (2008); Sager (2010); Wineburg *et al.* (2007); Flowers (2005)

[29]Appendix Table A.1 shows the number of laws implemented by state and time.

had implemented at least one law by 2009.[30]

Figure 2: States having implemented a faith-based initiative
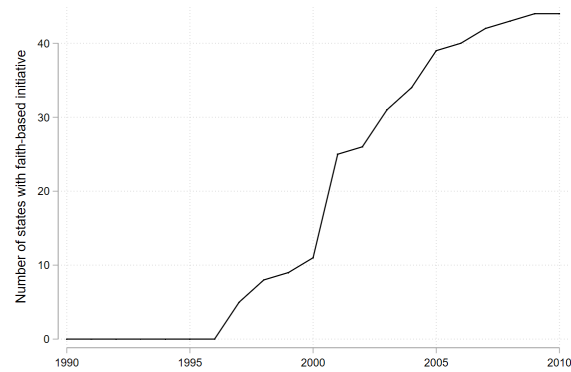
Figure 3 shows the spatial distribution of the implementation of the faith-based initiatives. Panel (a) shows the distribution of the first year of implementation, while panel (b) shows the distribution of the total number of faith-based initiatives implemented over the period 1996-2009.

Figure 3: The spatial spread of the faith-based initiatives 1997-2009

(a) Year of first faith-based initiative   (b) Total number of faith-based initiatives
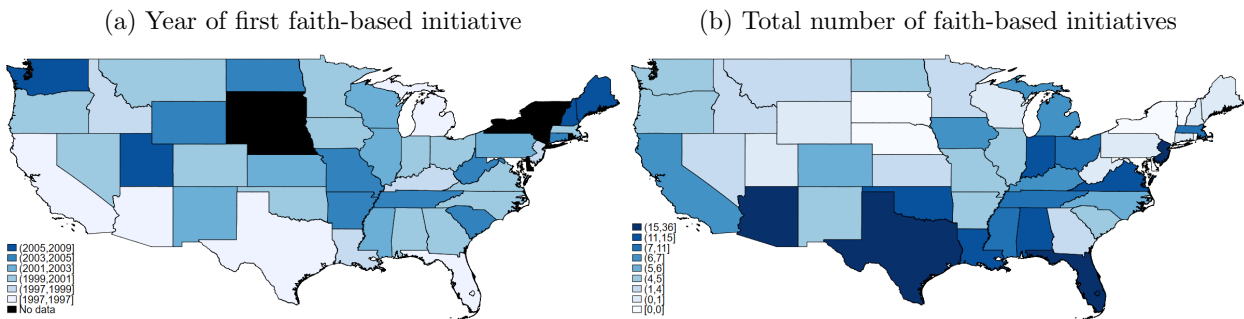
The first state to implement policies on Charitable Choice was Texas in 1997 under the governance of Governor George W. Bush, who believed in the power of religious groups to help the needy.[31] Not only was Texas the first to implement a faith-based initiative; it also implemented most faith-based initiatives over the period. The Texas liaisons, offices, and legislative requirements were the precursors to similar policies and practices now found across

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[30]Delaware, Nebraska, New York, Rhode Island, South Dakota, Vermont, and the District of Columbia had not implemented any faith-based initiatives by 2009.

[31]Sager (2010), p. 47.

the country. Another front-runner state was Florida, governed by Jeb Bush, who had similar political preference for the initiatives as his brother, George W. Bush. The implementation in these two states thus differ from the rest of the US, which also explains their position as outliers. For this reason, we exclude Texas and Florida from the main sample (results are robust to including Texas and Florida, see Appendix Table A.4).

Some states may have been more likely than others to implement faith-based policies. In particular, the decision to implement faith-based initiatives might have been influenced by religiosity of the state population or other important confounders with a bearing on religiosity. A priori, it is not obvious whether more or less religious states should be more or less likely to implement the initiatives. Many faith-based organizations were reluctant to engage in funding for government money out of fear of secularization.[32] Accordingly, we would predict more religious states to be *less* likely to implement faith-based initiatives. Indeed, this is what Figure A.1 shows. One could also have expected more religious states to be *more* likely to implement faith-based initiatives to attract funding for their many faith-based organizations.[33]

The implementation process at the state level was complex, varied, and personal (Sager (2010)). However, based on interviews with 30 faith-based liaisons in 2005, Sager identifies two main reasons for why states say they adopted the faith-based initiatives. First, because of the welfare cuts in the 1996 welfare reform, some states had to seek alternative ways to provide for their needy. Second, some politicians simply found the idea of reintegrating religion into the public sphere appealing. The sociological literature further points to two characteristics of states implementing the faith-based initiatives. First, the conservative evangelical movement was the first religious movement to endorse the faith-based initiatives (Sager (2010)). Second, African-American congregations were more likely to have familiarity with the faith-based initiatives (Wright (2009)).[34] Interviewing congregations in Atlanta, Georgia, Owens (2006) found that clergy attitudes towards entanglement with the government and the racial composition of

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[32]Chaves (1999), Sager (2010). This was also noticed by Alexis de Toqueville in the nineteenth century who observed that "any alliance with any political power whatsoever is bound to be burdensome for religion" (quote in Finke & Stark (2005)).

[33]Smith & Sosin (2001) find no relation between a measure of religiosity of the faith-based organizations and their amount of resources.

[34]Sager (2010) notes that "Seeing members of black religious groups as potential allies, supporters of faith-based polices and practices have focused on wooing them in two ways. First, a large proportion of those appointed as FBLs are black clergy members [...]. Second, state-sponsored faith-based conferences have specifically targeted the black religious community." Other scholars have pointed out the evangelical and black roots of the faith-based initiatives: Lindsay (2008); Monsma (2006); Olasky (1996); Smith & Emerson (1998).

members were the most important predictors of willingness to seek public funding.

None of these potentially systematic differences in state characteristics prior to the law changes is not a concern for our empirical analysis, as we include state fixed effects throughout, meaning that the levels of all confounders is removed from the analysis. Instead, our identification strategy relies on absence of systematic differences in *changes* in religiosity and other potentially important confounders before the legislative changes. Nevertheless, we account for the various confounders in our econometric analysis. Furthermore, we investigate whether states differ in systematic ways in terms of changes in relevant variables (Table 2 and Figures 5 and 6). Last, we limit the potentially omitted factors by only comparing pairs of counties separated by a state boarder and by using the synthetic control method.

Another concern is that the law changes have not been noticed by the public, and thus should not have a significant effect on religiosity or any other confounders for that matter. When describing how some of the initiatives were implemented, former advisor for President Bush states that "it was done very quietly, because we didn't want to draw undue attention to it or spark a bitter church-state debate."[35] This underlines that the changes were rather unheard of by the public, not necessarily because they were small, but because they were implemented discretely. For this reason, Jay Hein, former director of the White House Office of Faith-Based and Community Initiatives, has called the faith-based initiatives the "quiet revolution". According to Sager (2010), this quiet revolution means that state and federal institutions have been creating a myriad of faith-based practices, policies, and promises, enlarging the role played by religion in the public sphere.

Another concern is that the impact of the initiatives was temporary, since the law changes were rather small. On the other hand, if the initiatives changed the culture regarding church-state relations, the initiatives may have implications for years to come. We investigate the dynamics of the initiatives in Figures 5 and 6.

4   Conceptual Framework

The faith-based initiatives may have influenced churchgoing and religious beliefs in various ways. Figure 4 illustrates the contents of the faith-based initiatives (first column) and its' potential implications for religious attendance and beliefs. For illustrative purposes, we use

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[35]Sager (2010), p. 42.

the term "churches" as synonymous to the more general and more correct term "faith-based organizations".

Figure 4: The faith-based initiatives and religiosity

Contents of the faith-based initiatives:

- Increased welfare to churches
- Reduced regulations on churches
- Strengthened ties between state and churches

Direct effects:

- More churching
- More churches
- Strengthened public role of religion

Derivative effects:

- Intensified beliefs
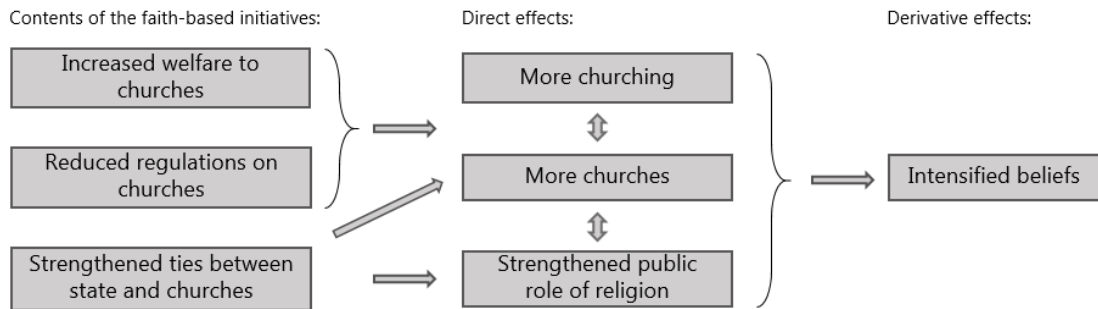
The part of the initiatives that involves provision of government services through churches may have induced churchgoing through standard religious market mechanisms: When benefits from churching rise, more people choose to go to church, much like the impact of missionary work. Since the particular government services are directed towards the poor, the prediction is larger effects of the faith-based initiatives on churchgoing for the poor. One could imagine that some of the persons going to church for welfare end up learning or believing some of the teachings preached. In this case, we would also predict larger effects on religious beliefs for the poor.

When more people go to church, the general benefit from churching may increase for all potential churchgoers across all socio-economic groups. Scheve *et al.* (2006) point out that individuals derive greater utility from being religious when others around them are religious. If this tendency plays an important role, we expect that all socio-economic groups begin to go to church more often and potentially also believe more.

Reduced regulations on faith-based organizations make it more profitable to open new faith-based organizations and also more likely that existing faith-based organizations survive. This increased supply of churches facilitates churchgoing and through that potentially also religious beliefs.

The strengthened ties between state and churches may induce more politicians to include religion in their speeches and in general intensify the degree of religion in the public sphere. Domke & Coe (2007) argue that many US politicians use what they call a "God strategy," or a strategy of using the language of faith to win support. Sager (2010) argues that the

faith-based initiatives have been used as such a "God strategy". In a more general context, Edelman (1985) argues that many public policies amount to a series of symbols that appeal to certain groups, representing ideas and values that they hold deeply, thus reassuring group members of their beliefs.[36] If politicians openly praise religion, people might be more inclined to become religious. The faith-based initiatives may have included such symbolic policies. If this is true, we expect the faith-based initiatives to increase religious attendance and beliefs across all socio-economic groups.

5 GSS Data and Empirical Analysis

Our empirical analysis begins with modeling their impact on religious attendance and beliefs. To carry out this analysis, we couple the data on the faith-based law changes with the General Social Survey (GSS). In most years since 1972, the GSS has asked respondents about their socio-economic characteristics, demographics, and various dimensions of their values set, including religious attendance and beliefs. We restrict the period of analysis to start in 1980 to have approximately equal pre and post treatment lengths, following McKenzie (2012).

The GSS includes one measure of religious attendance, which will form the first main dependent variable. The measure includes answers to the question "How often do you attend religious ceremonies?" Respondents can answer never, less than once per year, about once or twice per year, several times a year, about once a month, two to three times a month, nearly every week, every week, and several times a week.[37] The original variable takes values between 0 and 8, which we recode to values between 0 and 1. A mean attendance of 0.5 corresponds to attendance once a month. The GSS holds various measures of the intensity of religious beliefs, but one is available for much more respondents than the rest: Individuals' self-stated strength of religious affiliation, which will be our main measure of religious beliefs. The question reads "Would you call yourself a strong [religious denomination] or not a very strong [religious denomination]?" Respondents can answer no religion, not very strong, somewhat strong, or strong. We bundle the answers "not very strong" and "somewhat strong" into one category, as these are impossible to rank. Since the main analysis excludes respondents without an affiliation, the

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[36]Expanding on this work, Cobb & Elder (1972) argue that symbolic politics are important because "decision-makers actively engage in the manipulation of symbols and rationalize their action through them."

[37]Within our sample, this question on church attendance is asked in years 1980, 1982-1991, 1993, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, and 2010.

variable reduces to a dummy variable, where zero indicates "not very strong" and "somewhat strong" affiliation and one indicates "strong" affiliation. We check robustness of results with four additional measures of religious beliefs, available for at least 10,000 respondents in our sample. We turned them into the following dummy variables: beliefs in an afterlife, beliefs that the bible is the literal word of God, daily prayer, and beliefs in God.[38]

We use these data to estimate models of the form:[39]

$$religiosity_{its} = \gamma law_{t-1,s} + \kappa_s + \kappa_t + \omega X_{its} + \lambda W_{t-1,s} + \varepsilon_{its} \tag{1}$$

where $religiosity_{its}$ is the frequency of attendance at religious services in Section 5.2 and strength of religious affiliation in Section 5.3 for individual i at time t in state s. In our baseline model, $law_{t-1,s}$ is a dummy variable equal to one if state s implemented one or more faith-based laws at time $t-1$ or previously, zero otherwise. The individual law changes vary greatly in strength and it is not clear whether ten small laws should have a larger impact than one large one.[40] Our baseline model uses faith-based laws implemented in the previous year for two reasons: First, information on the year of interview is the most detailed information on the timing of the interview. Therefore, we do not know whether the individual was interviewed before or after the law change in the same year. Second, even if information on the month of interview was available, we would not necessarily expect that law changes at the state level result in an immediate change in church procedures or religion in the public sphere. We investigate dynamics in Figures 5 and 6.

X_{its} are individual-level controls, including the respondent's age and dummies for whether he/she is married or male in the baseline specification. Additional controls included for robustness are dummies for whether the respondent is protestant, catholic, black, foreign born, employed, or republican, respondent's real family income, education, and number of children. $W_{t-1,s}$ are time-varying state-level confounders in state s at time $t-1$. These include state

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[38]The particular GSS questions are described in Appendix A. Appendix Table A.12 shows the pairwise correlations between all measures of religiosity and Appendix Table A.2 shows the summary statistics.

[39]Throughout we use appropriate survey weights. We cluster our standard errors at the state level, following Bertrand *et al.* (2004) and Gruber & Hungerman (2008). The results are similar if standard errors are instead clustered at the state-by-year level (cf. Appendix Tables A.10 and A.11).

[40]The choice of a dummy variable instead of the actual number of laws follows Gruber & Hungerman (2008) and Autor (2003). The main results are robust to using the total number of laws (cf. Appendix Tables A.15 and A.13).

public spending per capita, the poverty rate, real GSP per capita, region-specific time trends, state-specific time trends, share blacks, share Protestants, mean respondent income, mean respondent education, initial values of the dependent variable interacted with time and initial values of possibly endogenous controls such as income level, educational level, share of blacks, share of protestants, and public spending interacted with time.

κ are state and time fixed effects. This "difference-in-difference" equation thus assesses whether implementing a faith-based initiative causes a deviation from the state mean of religious participation relative to other states at the time.

Our main analysis excludes respondents without a stated religious affiliation, as it is rather unlikely that the faith-based initiatives influence the religiosity of these individuals.[41] This is also what we find: the faith-based initiatives did not affect the number of individuals without a religious denomination (Appendix Table A.23).

5.1   Analysis of Pre-Trends

Our causal interpretation of the estimation of equation (1) rests on the assumption that nothing else changed at the time of implementation of the faith-based initiatives that also caused an increase in church attendance or beliefs. We present various tests designed to support this assumption. They all explore more formally what Figure 1 showed visually for church attendance. In this section, we assume that the timing of the treatment is year 1996 (the first year with a faith-based initiative). We show whether states that ended up implementing faith-based laws earlier differ in terms of attendance, beliefs, and socio-economic variables before 1996 compared to the states with late or no implementation. In reality, the timing of the treatment varies across states, and we will relax the assumption of treatment in 1996 in Sections 5.2 and 5.3. The rationale behind the analysis in this section is that the first implementations might have influenced neighboring states and thus focusing on 1996 as the treatment provides us with the cleanest test of pre-trends.

We check whether the average of potentially confounding socio-economic characteristics over the period before the faith-based initiatives (1980-1994) differ systematically between early and late adopters of the faith-based initiatives (following the procedure by Hornbeck &

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[41]Respondents without a stated religious affiliation make up appr. 10 pct of the sample. Including the non-affiliated does not change the conclusions, cf. Appendix Tables A.5 and A.8.

Naidu (2014)):[42]

$$Y_{its} = \gamma lawyears_s + \kappa_t + \kappa_r + \omega X_{its} + \varepsilon_{its} \qquad (2)$$

where Y_{its} is the characteristic being analyzed for individual i in state s measured at time t in the pre-period. These characteristics are the confounders included in the main analyses in Tables 3 and 5. $lawyears_s$ is the number of years state s has had a faith-based initiative over the period 1996-2009. Higher values indicate that the state was an early adopter. The results are similar if using instead the total number of laws implemented over the period (Appendix Table A.3). We choose the number of years since this is the variation used in the main analysis.

κ_t are time fixed effects. Since $lawyears_s$ does not vary over time, we cannot include state fixed effects in these regressions. Instead, we include fixed effects for the four regions of the US, κ_r.[43] X_{its} are the three baseline individual-level controls for age, married, and male.

A value of γ different from zero indicates that states that implemented faith-based initiatives earlier differ systematically compared to the late adopters.

Table 2 shows the mean of the variables over the entire period of analysis 1980-2010 in column (1), and the number of observations in column (2). Column (3) shows the means for the period 1980-1994 and column (4) the number of observations in this pre-treatment period. From column (5) onward, each row represents one regression of equation (2), one for each characteristic Y. Column (5) shows the estimates of γ without controls, i.e. the raw correlation between the particular characteristic in the period 1980-1994 and the timing of implementation in the following period. Column (6) shows the same correlations after including baseline controls for respondents' age, gender, and marital status, together with time and region fixed effects. Early adopters tend to have lower church attendance rates and lower strength of affiliation, which is consistent with the literature noting that many faith-based organizations were reluctant to cooperate with the state in the beginning. Early adopters also have lower public welfare spending per capita, which is consistent with the idea that some of the

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[42]As the GSS was not sampled in year 1995, the pre-period ends in 1994.

[43]North East: Maine, Massachusetts, Rhode Island, Connecticut, New Hampshire, Vermont, New York, Pennsylvania, New Jersey, and Delaware. Midwest: Ohio, Indiana, Michigan, Illinois, Missouri, Wisconsin, Minnesota, Iowa, Kansas, Nebraska, South Dakota, and North Dakota. South: West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Arkansas, Louisiana, Maryland, and Oklahoma. West: Colorado, Wyoming, Montana, Idaho, Washington, Oregon, Utah, Nevada, California, Alaska, Hawaii, New Mexico, and Arizona

faith-based initiatives were meant to compensate for lower welfare spending.[44] Early adopters, however, also have higher average incomes (based on the GSS measure of family incomes), which seems to contradict the welfare-purpose of the initiatives. Also, early adopter-states had more blacks after accounting for the baseline controls. The latter is consistent with the idea that the African-American congregations have been more prone to use the faith-based initiatives (Wright, 2009). Early adopters had fewer Protestants after accounting for the baseline controls, which might contradict the sociology literature, which argued that evangelicals were more prone to implement the faith-based initiatives. This could also be because the remaining denominations in the broad group of Protestants pull in the opposite direction.

Since our baseline specification will be a difference-in-difference model, our identification strategy does not hinge on similarity in the *levels* of the characteristics. Instead, the *changes*, i.e. the pre-trends, in the characteristics should not vary systematically. To investigate changes over time, we aggregate the data to the state-year level, and estimate the following regression:[45]

$$\bar{Y}_{ts} - \bar{Y}_{t-1,s} = \gamma lawyears_s + \kappa_t + \kappa_r + \omega \bar{X}_{ts} + \varepsilon_{ts} \tag{3}$$

where $\bar{Y}$ and $\bar{X}$ are state-year averages of the particular variables. $\bar{Y}_{ts} - \bar{Y}_{t-1,s}$ is the change in the investigated characteristics from the prior survey year $t-1$ to the current year t, all measured over the period 1980-1994.[46] Column (7) of Table 2 shows that the early adopters do not differ systematically compared to the late adopters based on the yearly changes in any of the included characteristics. Column (8) confirms this conclusion including the three baseline controls and time and region fixed effects.

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[44]Public welfare spending is available at the state level, and thus the 379 observations indicate the number of state-years with public spending data available.

[45]The same individuals are not surveyed over time, but instead we treat the state as the panel dimension in a so-called synthetic panel setup.

[46]The panel is unbalanced since every variable is not included in every survey year. For 75 pct of the sample, the yearly change spans 1 year, while the change for the remaining 25 pct spans 2 years, except for two state-year observations where the change spans 3 and 12 years, respectively. The results are unaltered if we restrict the sample to either 2 years or below or 1 year or below.

Table 2: Correlations between pre-period characteristics and total number of years with a law implemented ex post

	1980-2010		1980-1994		Levels		Changes	
Characteristic, Y	Sample mean	N	Sample mean	N	Raw	Controls	Raw	Controls
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attendance	0.472	39,355	0.529	17,826	-0.002***	-0.005***	-0.002	-0.001
	(0.340)		(0.323)		(0.001)	(0.001)	(0.002)	(0.002)
Strength of affiliation	0.434	33,662	0.430	17,212	-0.003**	-0.006***	-0.002	-0.003
	(0.496)		(0.495)		(0.001)	(0.002)	(0.003)	(0.003)
Protestant	0.580	39,613	0.685	17,957	0.007***	-0.011***	0.000	0.000
	(0.494)		(0.464)		(0.001)	(0.001)	(0.002)	(0.003)
Income	31.682	35,562	29.692	16,333	-0.0730	0.286***	-0.058	-0.081
	(29.554)		(25.900)		(0.068)	(0.087)	(0.166)	(0.172)
Black	0.144	39,785	0.150	17,954	-0.005***	0.004***	0.000	0.001
	(0.351)		(0.357)		(0.001)	(0.001)	(0.003)	(0.003)
Educational level	13.007	39,676	12.531	17,924	0.012*	-0.012	-0.010	-0.008
	(3.090)		(3.117)		(0.006)	(0.008)	(0.021)	(0.022)
Public Welfare spending	721.64	1,101	331.530	379	-2.768	-2.275***	-0.319	-0.641
	(478.31)		(210.368)		(2.964)	(0.450)	(0.825)	(0.774)
Age	45.803	39,642	45.927	17,893	-0.023		0.033	
	(17.444)		(17.796)		(0.035)		(0.090)	
Married	0.507	39,766	0.5523003	17,954	0.000		0.000	
	(0.500)		0.497271		(0.001)		(0.002)	
Male	0.436	39,785	0.416	17,957	0.002		0.000	
	(0.496)		(0.493)		0.001		(0.002)	

Each of the estimates in columns (5)-(8) represent the outcome of one OLS regression. Controls include region and year fixed effects, and controls for age, married and male. Robust standard errors in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. The number of observations in columns (7)-(8) is 429.

These analyses confirms what Figure 1 showed visually and is promising to our identification strategy: The states that implemented faith-based initiatives earlier do not differ systematically in terms of changes in key variables before any initiatives were implemented, compared to states that implemented the faith-based initiatives later or never at all.

5.2 Church Attendance

Table 3 shows the impact of the faith-based initiatives on church attendance over the entire period from 1980 to 2010, i.e. estimation of equation (1). All regressions include year of survey and state fixed effects. Column (1) shows that average church attendance increased significantly in states after having implemented one or more faith-based laws in the previous year. The result is robust to including standard individual-level controls for respondent's age and dummies for whether the respondent is married or male (column 2). The estimates on the control variables mimic what is otherwise found in the literature. For instance, the well-documented higher religiosity for women is replicated here. Having implemented one or more laws increases church attendance by 2.8 pct points. This amounts to 5.4% of the mean level of church attendance

or 200% of the mean change in church attendance over the period 1980-2010. Comparing the standardized betas, the effect is around one-third of the higher attendance rate for women.[47]

Since the laws might have been implemented as a substitute for low welfare, one concern is that the laws were more likely to be implemented in poorer states. These states might at the same time be more religious according to the secularization hypothesis.[48] We include controls for individual-level income in column (3) and education in column (4). The estimate on the faith-based laws remains stable. Richer and more educated individuals attend church more often. We are not the first to show results contradicting the secularization hypothesis.[49] A direct measure of state-level public spending in the previous year is included column (5). The result is maintained and public welfare spending per capita does not influence attendance significantly in this model.

Scholars have pointed out that the faith-based initiatives have been mainly an evangelical movement, speaking mainly to the black population. We will check whether the effect of the initiatives is in fact driven by these population groups, but for now we simply include controls for blacks and protestants. Adding a dummy for whether the respondent belongs to a protestant denomination does not alter the results (column 6). And neither does adding a dummy for whether the respondent is African-American (column 7).

One may still be concerned that the results are driven by something systematic about the states that adopted the faith-based initiatives. The pre-trends analysis in Section 5.1 assumed that the pre-period was fixed at 1980-1994 for all states. Column (8) instead includes the lead of the law variable. The parameter shows the difference in terms of attendance rates between states that are about to implement a law in the next period. States do not systematically differ in terms of changes in church attendance when observed the year before they implement faith-based initiatives. This gives further confidence in our identification strategy.

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[47]The standardized beta for law_{t-1} is 0.037, while the standardized beta for the male dummy is -0.11.

[48]The secularization hypothesis predicts that religiosity falls as societies modernize.

[49]See Stark & Finke (2000), Glaeser & Sacerdote (2008), and Iannaccone (1998) for discussions.

Table 3: Impact of faith-based initiatives on churchgoing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent variable: Frequency of church attendance [0;1]				
Law$_{t-1}$	0.027***	0.028***	0.026***	0.028***	0.032***	0.027***	0.025**	0.019**
	(0.010)	(0.010)	(0.009)	(0.010)	(0.011)	(0.010)	(0.010)	(0.009)
Age		0.0017***	0.0018***	0.0021***	0.0017***	0.0017***	0.0017***	0.0017***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male		-0.071***	-0.073***	-0.073***	-0.073***	-0.072***	-0.070***	-0.071***
		(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Married		0.069***	0.061***	0.063***	0.069***	0.069***	0.078***	0.069***
		(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Family income			32.1**					
			(14.787)					
Education				0.011***				
				(0.002)				
Public Welfare spending$_{t-1}$					0.000041			
					(0.000)			
Protestant						-0.011		
						(0.009)		
Black							0.083***	
							(0.005)	
Law$_{t+1}$								0.016
								(0.012)
Adj. R^2	0.024	0.056	0.058	0.065	0.058	0.063	0.063	0.056
N	34729	34624	31064	34556	29679	33145	34624	34624
Mean DV	0.52	0.52	0.52	0.52	0.51	0.52	0.52	0.52
			Mean change in dependent variable 1980-2010: -0.013					

OLS estimates. All regressions include year of survey and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

As a last check of potential differences in states before implementation of the faith-based initiatives and also as a check of the dynamics, Figure 5 splits the law dummy into fifteen separate dummies depending on when the first law was implemented, following Autor (2003). This specification includes fourteen law dummies, each turned on only in the specific year from seven years before the first law to six years after the first law implementation and one law dummy turned on 7 years after the first law and forever thereafter. The base period is the period prior to seven years before the implementation of the first law. The estimate on the law dummy in the specification in Table 3 sums over the impacts on church going one year after the law change and forever thereafter.

Point zero in Figure 5 indicates the impact of faith-based initiatives in the year of implementation. The impact is close to zero and the standard errors are quite large, which corresponds well with the problem that we cannot distinguish whether GSS respondents were asked before or after implementation of the faith-based initiatives in the year of interview. Church attendance increases the year after the first implementation, though the increase is not significant

until 5 years after the first implementation. Point minus one shows the difference in church going in states that are just about to implement a law in the next period. The difference is not statistically different from zero. The same is true for years 2-7 before the law change, except that states seem to experience *lower* church attendance three years prior to the law implementation. This gives us further confidence in our identification strategy. We also note that the laws seem to have rather long-lasting effects on church attendance, which seems reasonable in that most laws induce a permanent institutional change.

Figure 5: Difference in churchgoing before and after first law
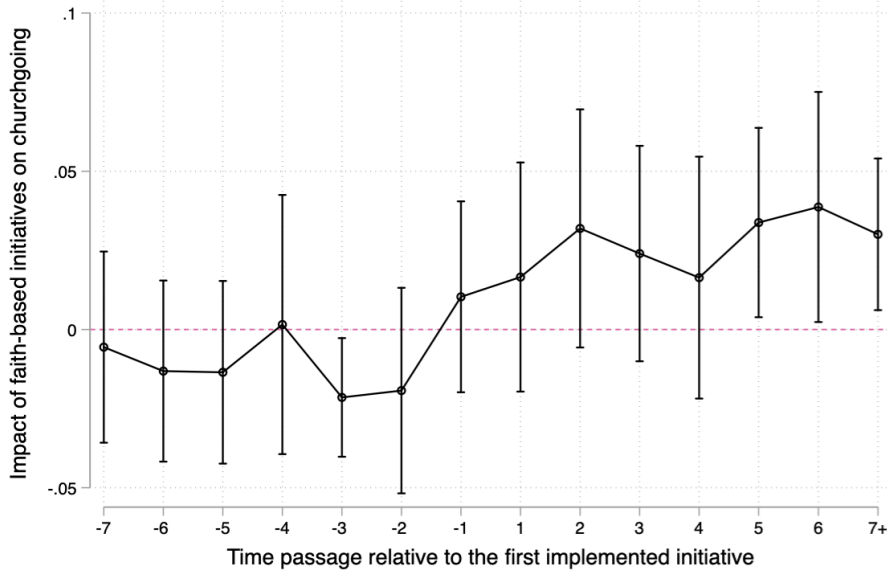
Note: OLS regression of churchgoing on leads and lags of the law dummy. Each estimates indicates the impact of a law in that particular year only, except for the last estimate to the right, which measures the impact on churchgoing seven years or more after the law change. Includes baseline controls for age, marital status, gender, and year - and state fixed effects. The vertical bands represent the 95 percent confidence interval based on robust standard errors clustered by state.

To understand the nature of the shifts in attendance, Table 4 shows separate results across attendance levels. Each column is a separate regression where a dummy for that attendance category is used as the dependent variable. The eight categories are bulked together into four overall categories to ensure enough variation in each variable.[50] The laws reduce the share of individuals attending never or almost never (column 1) and increase the share who attend

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[50]Keeping the nine different categories of attendance shows the same overall results, though only the decrease in the share never attending church and the increase in the share attending yearly are significant

weekly or yearly. The laws thus induce those who belong to a denomination, but who previously did not go to church to start going to church.

Table 4: Impact of faith-based initiatives, by attendance level

	(1) Never	(2) Yearly	(3) Monthly	(4) Weekly
Law_{t-1}	-0.055***	0.032***	-0.0020	0.025**
	(0.011)	(0.012)	(0.013)	(0.010)
Adj. R^2	0.023	0.024	0.011	0.049
N	34624	34624	34624	34624
Mean DV	0.18	0.27	0.24	0.31
Mean change in DV 1980-2010:	0.034	-0.066	0.034	-0.002

OLS estimates. All regressions include year of survey and state fixed effects, and respondent controls for age, marital status, and gender. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

5.3 Religious Beliefs

The finding that church attendance increases in response to increased benefits from church going is perhaps not very surprising. This section investigates whether the laws also changed peoples' religious beliefs, measured by the strength of religious affiliation.

Table 5 shows that strength of religious affiliation increases after states implement one or more faith-based initiatives. The result is robust to including controls for gender, marital status, age, income, education, past public spending and dummies for whether the respondent is protestant or black. Column (8) shows that states that implement a faith-based initiative next year are no different in terms of religious beliefs compared to states that do not, giving confidence in our identification strategy.

The size of the estimate is economically significant. Taking the estimate in column (2) at face value, implementing one or more laws increases average strength of affiliation in the next period with 3.3 pct points. This amounts to 7.4% of the average strength of affiliation or nearly three times the average decline in religiosity over the period.

Table 5: Impact of faith-based initiatives on religious beliefs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Strength of affiliation [0;1]							
Law_{t-1}	0.030***	0.033***	0.025*	0.033***	0.038***	0.033***	0.028**	0.032**
	(0.010)	(0.011)	(0.013)	(0.012)	(0.013)	(0.012)	(0.011)	(0.013)
Age		0.0035***	0.0034***	0.0038***	0.0035***	0.0035***	0.0036***	0.0035***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male		-0.099***	-0.096***	-0.100***	-0.097***	-0.099***	-0.096***	-0.099***
		(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Married		0.035***	0.038***	0.031***	0.036***	0.035***	0.049***	0.035***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)
Family income			-19578.0					
			(12975.728)					
Education				0.0069***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.00011***			
					(0.000)			
Protestant						0.0081		
						(0.009)		
Black							0.13***	
							(0.014)	
Law_{t+1}								0.0012
								(0.017)
Adj. R^2	0.015	0.042	0.039	0.044	0.044	0.052	0.050	0.042
N	33660	33560	30139	33496	28785	32270	33560	33560
Mean DV	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
	Mean change in dependent variable 1980-2010: -0.011							

OLS estimates. All regressions include year of survey and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Akin to Figure 5, Figure 6 shows the estimated effect on the strength of affiliation over time. Supportive of our common trends assumption, strength of affiliation does not differ systematically before implementation of the first law. Insignificance of differences continues in the first years after the implementation, supportive of some persistence in religious beliefs. The strength of religious affiliation increases from five years after the first implementation and thereafter. Again, this gives confidence in our identification strategy. Furthermore, we note that both religious beliefs and attendance seem to be influenced by the laws with a lag of five years.

Figure 6: Difference in religious beliefs before and after first law

Table 6 shows the impact of the faith-based initiatives on the additional measures of religious beliefs in the GSS with at least 10,000 observations. Implementing one or more faith-based initiatives increases the likelihood that the state population believes the bible to be the literal word of God, prays daily or more often, and believes in God. The laws do not influence whether the state population believes in an Afterlife. The latter could be due to the fact that close to the entire sample (84%) believe in an Afterlife.

Table 6: Impact of faith-based initiatives on alternative measures of religious beliefs

	(1) Afterlife	(2) Bible	(3) Prayer	(4) God
Law$_{t-1}$	-0.012	0.037*	0.051***	0.046**
	(0.019)	(0.022)	(0.019)	(0.022)
Adj. R^2	0.019	0.066	0.099	0.055
N	22559	20395	20483	11545
Mean DV	0.84	0.36	0.60	0.68
Mean change in DV:	0.021	0.027	0.081	-0.010

OLS estimates. All regressions include year of survey and state fixed effects, and respondent controls for age, marital status, and gender. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. The period for the mean change in the dependent variable is 1980-2010 for beliefs in afterlife, 1984-2010 for confidence in the bible, 1983-2010 for daily prayer, and 1988-2010 for beliefs in God due to data availability.

5.4 Heterogeneity

The faith-based initiatives probably did not influence all types of individuals equally. This section checks the heterogeneity of the results.

First, Figure 7 shows added-variables plots of the main regressions including state- and year fixed effects together with controls for male, married, and age, where individuals are binned into 100 equally sized bins. The results do not seem to be driven by a particular group of individuals. As a further check of homogeneity across space, we find that the laws increase churchgoing and strength of affiliation in all four major regions of the US and the Rust Belt (Appendix Table A.14).[51]

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[51]The Rust Belt includes Pennsylvania, Ohio, Michigan, missouri, Indiana, West Virginia, Wisconsin, New York, Illinois.

Figure 7: Binned added-variables plots of the impact of the laws on religiosity

(a) Church attendance

(b) Strength of affiliation
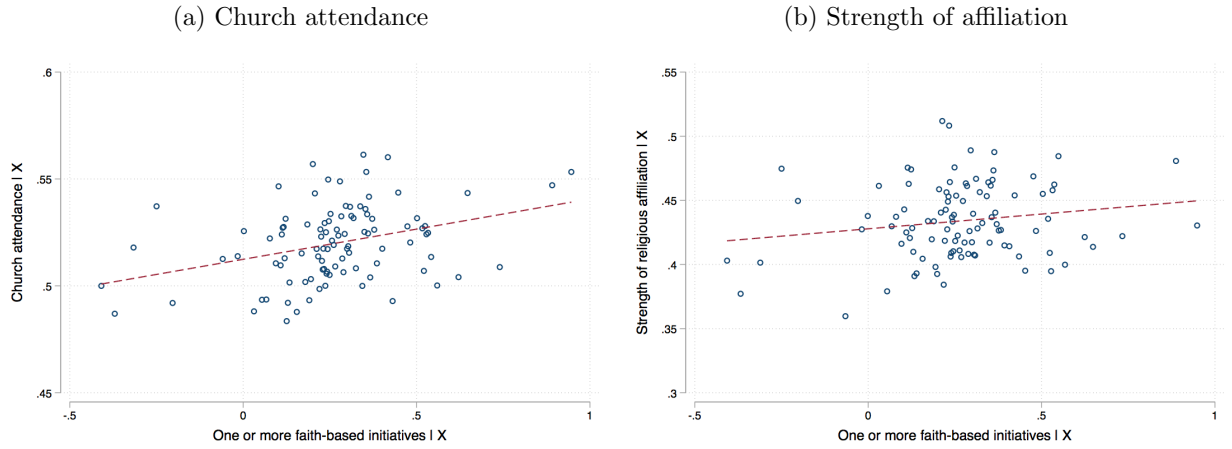
Note: OLS regressions corresponding to column (2) of Tables 3 and 5. Individuals binned into 100 equally sized bins.

We proceed to check for heterogeneity with respect to income. If the impact of the faith-based initiatives is driven by increased welfare through the churches, we expect that the impact of the initiatives is larger for the poor. To investigate, we add an interaction term with income to the specification in equation (1). We find that families with incomes below \$90,000 attended church more often after the laws were implemented, while there was no significant effect on churchgoing for richer individuals (Appendix Figure A.2). This is consistent with the idea that the faith-based initiatives attracted poor welfare receivers into the churches. But since the rich on average go more to church (col 3 of Table 3), it could also be a consequence of saturated attendance rates for the rich. The income gradient with respect to strength of affiliation is less clear. If anything, it is the middle income individuals who respond most with increased beliefs. Thus the effect is not exclusively explained by poor individuals becoming more religious while churching for welfare. The effect can also not be driven by an attempt to reduce cognitive dissonance, since it is not the same individuals stating increased religious beliefs as those going more to church. Similar results are found for education levels; the laws increase churchgoing more for the less educated, while the impact on religious beliefs does not depend on education levels. Note that incomes and education might be affected by the initiatives, which sheds doubt on these estimates. We will investigate this further in Section 5.7.

We investigated additional heterogeneities in Appendix Tables A.15 and A.16. The entire

effect of the laws is borne by increased religiosity of protestants and a large chunk is born by blacks. This is consistent with the sociological literature, singling these particular groups out as being most influenced by the faith-based initiatives.

One concern is that the results are driven by a state-specific effect of the 1996 welfare reform, even though the reform was implemented at the federal level. In that case, we expect that the impact of the faith-based initiatives varies with confounders correlated with public spending. We show that the impact of the faith-based initiatives does not vary with public spending. We also find that the impact of the faith-based initiatives is not larger for foreign borns. The latter check is based on the study by Hungerman (2005) who found that foreign borns were more affected by the 1996 welfare reform.

Our main measure of the faith based initiatives does not take into account the number of laws; only whether one or more laws were implemented or not. The impact on church attendance is stronger in states that implemented more laws, while the number of laws does not matter for the effect on religious beliefs (Appendix Table A.16).

One could imagine that the impact of the laws vary with the types of laws. Sager (2010) bundles the different laws into four broad groups; symbolic laws, concrete laws, prison laws, and program laws. All types of laws exert a significant and positive effect on churchgoing and strength of affiliation (Appendix Table A.13). The result that the impact of symbolic laws is similar to concrete laws is consistent with the idea from the sociological literature that the laws influenced society in addition to their effects on welfare provision.

5.5 Supply of Religion

This section investigates two types of mechanisms of the supply of religion to the public; the amount of churches and religious non-profit organizations in general and the religious denomination of politicians.

The faith-based initiatives may have increased the supply of faith-based organizations through the ease on regulations for faith-based organizations, the general increase in attendance and beliefs rates, and the strengthened ties between state and faith-based organizations. One purpose of the latter was to make it easier for faith-based organizations to obtain public funds. These components of the faith-based initiatives may have made it more beneficial to open new faith-based organizations and may have increased the likelihood of surviving for ex-

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isting faith-based organizations. We test this idea using two different datasets on the supply of faith-based organizations. First, we use longitudinal data on churches and church membership in 1980, 1990, 2000, and 2010 at state level (see Appendix A for further details). Table 7 shows that the number of churches increased as states implemented more faith-based initiatives. The effect on adherents goes in the same direction, but is weaker.

Table 7: Impact of faith-based initiatives on the number of churches and adherents

	(1)	(2)	(3)	(4)
Dep var:	Number of churches		Number of adherents	
Law_{t-1}	1.07***	1.52***	53.3*	61.8
	(0.392)	(0.519)	(28.604)	(37.735)
Total population		0.025***		0.46*
		(0.009)		(0.262)
Adj. R^2	0.88	0.90	0.95	0.95
N	196	196	196	196
Mean DV	6.09	6.09	266.6	266.6

OLS estimates across state-years. All regressions time and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

We proceed to examine whether the faith-based initiatives influenced the number of religious non-profit organizations in general. We use data on the universe of non-profit organizations in the US from the NCCS (see details in Appendix A.6). We construct two different indicators of whether the organization is religious. The first indicator is equal to one if the organization has grouped itself as a religious organization from a list of 25 different groups. This indicator misses religiously grounded organizations with a primary purpose of education. Therefore, we construct a second indicator equal to one if the name of the organization includes religious terms, such as "christian" or "church" or many others. Table 8 shows that the share of organizations with a religious name or a stated religious primary purpose increase in the aftermath of the faith-based initiatives.

Table 8: Impact of faith-based initiatives on number of religious non-profits

	(1)	(2)	(3)	(4)
Dep var:	religious name		religious org	
Law$_{t-1}$	0.017***	0.016***	0.0093**	0.0081*
	(0.000)	(0.000)	(0.000)	(0.000)
Private org		-0.020***		-0.012***
		(0.001)		(0.002)
r2_a	0.013	0.025	0.040	0.043
N	4212286	4212286	3841271	3841271
ymean	0.34	0.34	0.30	0.30

OLS estimates across non-profit organizations. All regressions include time and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

To test the idea that the faith-based initiatives may have strengthened the role of religion in the public sphere, we use a dataset on the religious denominations of state politicians from adherents.com (described in Appendix A.7). We code a politician as being non-religious if his/her religious denomination is indicated as "unknown" or "unspecified". The share of non-religious politicians is falling over time. Table 9 shows that the state is less likely to have one or more politicians without a religious denomination after implementing faith-based initiatives.

Table 9: Impact of faith-based organizations on religiosity of politicians

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dpendent variable:				Non-religious dummy			
Laws_{t-1}	-0.10*	-0.096*	-0.095*	-0.11*	-0.10*	-0.12**	-0.10*
	(0.054)	(0.054)	(0.054)	(0.056)	(0.054)	(0.052)	(0.053)
Democrat politicians, share		0.11					
		(0.205)					
Republican politicians, share			-0.13				
			(0.209)				
Protestant politicians, share				-0.21			
				(0.265)			
Catholic politicians, share					0.20		
					(0.250)		
Public Welfare spending$_{t-1}$						0.46	
						(1.403)	
GSP_{t-1}							-0.29
							(0.692)
Constant	0.17***	0.12	0.24**	0.30*	0.11	0.13	0.28
	(0.009)	(0.097)	(0.110)	(0.164)	(0.074)	(0.110)	(0.253)
R2	0.47	0.47	0.47	0.47	0.47	0.45	0.47
N	232	232	232	232	232	211	232

OLS estimates across state-years. All regressions include time and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

5.6 Further Robustness and Mechanisms

This section explores further robustness of the results.

The pre-trends analyses give confidence that the states that adopted faith-based initiatives earlier did not differ systematically relative to late-adopters in the period before any faith-based initiatives were implemented. A concern remains that something unaccounted for influenced implementation and religiosity in a time-varying way that changed at the same time as the faith-based initiatives were introduced. We take two approaches to limit these unobserved differences. First, we restrict the sample to counties that neighbor a state border and compare counties in pairs that are split by a state border, following Dube *et al.* (2010). We now estimate equation (1) including county-pair fixed effects in Table 10. The mere restriction of the sample doubles parameter estimates and standard errors. Adding the contiguous county pair fixed effects does not affect the estimates. Thus even in this restricted sample, where unobserved characteristics are likely to be very similar, religiosity increases significantly after implementation of faith-based initiatives.

Table 10: Impact of faith-based initiatives in contiguous counties

	(1)	(2)	(3)	(4)
	Attendance [0;1]		Affiliation [0;1]	
Law$_{t-1}$	0.0557**	0.0550**	0.0708**	0.0715***
	(0.026)	(0.022)	(0.032)	(0.023)
Adj. R^2	0.0650	0.0583	0.0357	0.0329
N	7117	7117	6937	6937
Contiguous county pair FE	Yes	No	Yes	No

OLS estimates. All regressions include baseline controls for respondents' age, gender, and marital status together with year of survey - and state fixed effects. Robust standard errors clustered at the state and county pair level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

As a second attempt to reduce the differences in unobserved characteristics, we use the method of synthetic controls. This method compares an estimate of the counterfactual development in religiosity in the absence of law changes to the actual development in religiosity. To construct a synthetic control group, we restrict the sample to a balanced panel, which means reducing the sample to 29 states over the period 1993-2010. This means that the pre- and post periods consist of only two years each.[52] The three baseline variables age, married, and male are included as predictors. The actual development in religious attendance and beliefs in states that implemented faith-based initiatives is significantly higher than the predicted levels of religiosity based on the pre-treatment period trends, shown visually in Figure 8. This provides greater confidence that our results are not driven by a similar development in unobserved characteristics.

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[52]The synthetic control estimation is implemented using the *synth_runner* procedure by Galiani & Quistorff (2017) making it possible to have several treatment units and times.

Figure 8: Impact of faith-based initiatives in a synthetic control panel

(a) Attendance

(b) Affiliation
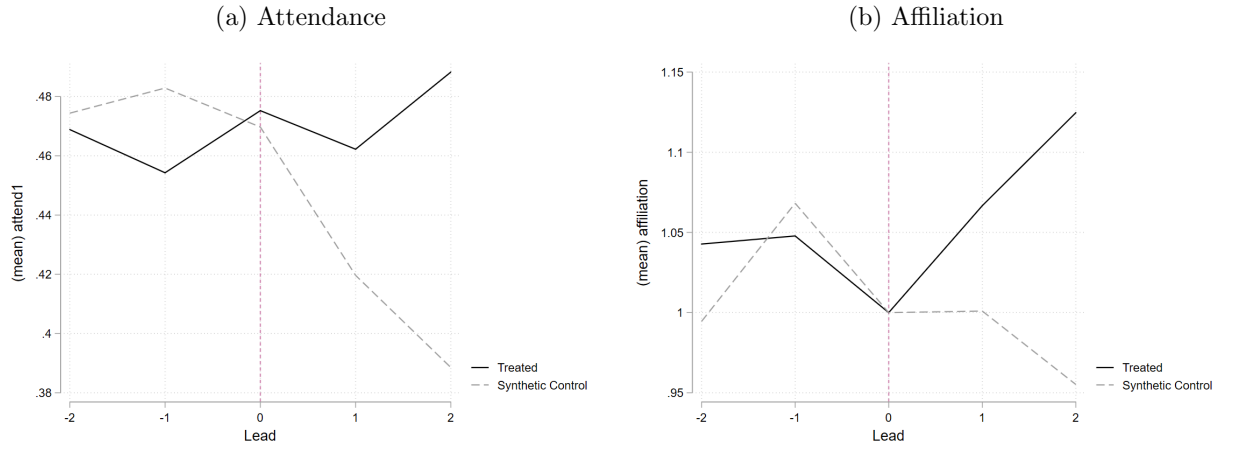
Note: Averages taken across states without missing years. Included states are alabama, arizona, california, colorado, connecticut, district of columbia, georgia, illinois, indiana, kansas, kentucky, louisiana, maryland, massachusetts, michigan, minnesota, missouri, new jersey, new york, north carolina, ohio, oklahoma, oregon, pennsylvania, south carolina, tennessee, virginia, washington, and wisconsin. The dependent variable is normalized to 1 in period 0.

One concern is that the impact of the faith-based initiatives on individual religiosity could be counteracted by a reduction in private contributions and thus the impact on overall religiosity would be ambiguous. Hungerman (2005) finds evidence of a crowding out mechanism between church attendance and contributions. If such a crowding out is occurring, the net effect on the amount of resources in churches is ambiguous. On the other hand, one could imagine that the more religious individuals in the aftermath of the faith-based initiatives would donate more to the church as a way of thanking and honoring the church they now visit more often. We utilize the consumer expenditure survey (CEX) which is a survey of individuals asking how much they donate to charitable organizations. Due to data breaks, the data is restricted to the period 1996-2001. Table 11 shows that the faith-based initiatives neither affects the likelihood of donating to religious organizations nor the amount given.

Table 11: Impact of faith-based initiatives on religious donations

	(1)	(2)	(3)	(4)
	Giving dummy		Total giving	
Law_{t-1}	0.0044	0.0045	-0.99	0.31
	(0.004)	(0.004)	(8.512)	(8.533)
Number of adults in CU	0.00072	0.00072	7.60*	7.61*
	(0.002)	(0.002)	(4.158)	(4.154)
Interview month	-0.00067**	-0.00067**	0.50	0.50
	(0.000)	(0.000)	(0.728)	(0.729)
Law_{t+1}		0.00097		10.7
		(0.006)		(11.109)
Adj. R^2	0.016	0.016	0.019	0.019
N	96257	96257	96257	96257
Mean of DV	0.080	0.080	96.8	

OLS estimates. All regressions include year of survey and state fixed effects, and respondent controls for age, marital status, and gender. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

The results are robust to including additional individual-level controls: Dummies for whether the respondent is employed, republican, Catholic, foreign born or has a degree, and a control for his/her number of children (Appendix Tables A.17 and A.18). The results are also robust to including additional controls at the state-level: The state-level poverty rate, GSP per capita, share of Protestants, share of blacks, mean family income and mean education levels (Appendix Tables A.19 and A.20). Including state-specific trends lowers the p-value on the estimate on church attendance to 0.121 and religious affiliation to 0.186. Including instead the less conservative regional trends, church attendance remains significant at the 5 pct level and the p-value on beliefs is 0.109.

To avoid problems of endogenous controls and mean reversion we also include initial values of both the dependent variables, and state level share of blacks, education level, income level, share protestants, and public spending, interacted with time (Appendix Tables A.21 and A.22). The results are robust to these additions.

One concern is the validity of the data collected from Lexis Nexis. We use instead information on the timing of implementation of the two main institutions involved in the faith-based initiatives; the faith-based liaisons (FBL) and offices of faith-based initiatives (OFBCI). The FBL was the main person responsible for the faith-based initiatives at the state level and the OFBCI were offices implemented to support his / her work. Consistent with remaining results, we find that religious attendance and beliefs increase when states implement a faith-based liaison. The strength of religious beliefs increase further when states also implement an OFBCI

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office, but this institution does not increase church attendance further.

If the laws influenced religiosity, they should also influence cultural values related to religiosity. To select the set of cultural values, we rely on the study by Guiso *et al.* (2003), who find that on average religious individuals in the World Values Survey are more trusting in the government, less willing to commit economic crimes, value hard work more, have more conservative views on the role of women, are more likely to be racist, and last, religious individuals raised in the dominant religion are less likely to trust other people. Identifying similar measures in the GSS available for at least 10.000 observations, we find that views against homosexuality increased in the aftermath of the faith-based initiatives, while confidence in the scientific community and trust fell, consistent with the findings of Guiso *et al.* (2003) (Appendix Table A.26, data descriptions in the Data Appendix A).[53] The laws did not influence views on abortion, approval of women working, or whether respondents view themselves as conservative.

As another consistency check, we find that laws implemented in the neighbor state increases religious attendance and beliefs significantly, but by much less than the laws in ones own state which retain their level of significance (Appendix Table A.25).

An alternative potential mechanism is based on an idea in the sociological literature that the initiatives were used by the Republicans to attract voters. To test, we use two different datasets; the GSS has information on whether the respondents think of themselves as conservative or not, whether they voted republican at the last election, and whether they voted at all.[54] We find the second set of measures in The American National Election Studies (ANES) with comparable information on voting behavior since 1992. We find no effects on feeling conservative, voting republican or voting in general in either dataset (Appendix Tables A.27 and A.28).

5.7   Impact on Well-being

If religious providers are more effective in providing social services as argued by the proponents of the initiatives, the conditions for the poor should improve in the immediate aftermath of the initiatives. However, the small size of the budgets involved in the initiatives will go against finding effects on well-being. Nevertheless, below we investigate the impact of the faith-based initiatives on well-being, using state level and individual level data.

Using data on state-level indicators of well-being, Table 12 shows that the faith-based

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[53]Some other studies have found a positive correlation between religiosty and trust.

[54]The exact questions are presented in Appendix A and summary statistics in Appendix Table A.2

initiatives did not influence state-level poverty rates, public welfare, public health, deaths by overdoses, alcohol or other causes of death or crime rates (data described in Data Appendix A.8). These insignificant findings are consistent with existing analyses that found that the initiatives have not made anything but modest gains in well-being.[55]

Table 12: Impact of faith-based initiatives on state level outcomes

	(1) Poverty	(2) Public welfare	(3) Public health	(4) Correction	(5) Deaths by OD	(6) Deaths by alcohol	(7) Violent crimes	(8) Other deaths
Law_{t-1}	-0.040	58.6	-4.13	12.7	-53.2	-10.8	51.8	199.1
	(0.361)	(36.057)	(14.919)	(10.355)	(67.685)	(24.668)	(70.807)	(638.276)
Adj. R^2	0.80	0.94	0.76	0.89	0.93	0.99	0.90	1.00
N	767	650	650	650	221	223	767	223
Mean DV	13.3	569.9	98.4	80.3	636.6	455.3	514.2	51541.5

OLS estimates. All regressions include year of survey and state fixed effects. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table 13 shows the results of individual measures of income related activities, satisfaction and well-being found in the GSS (data description in Appendix A). The GSS has multiple potential measures of well-being. We chose the variables with the most non-missing observations. There are no significant effects of the faith-based initiative on hours worked or a dummy indicating less than 20 hours worked, real family income, educational attainment, a dummy indicating high educational attainment, job satisfaction, financial satisfaction or self-reported improvement in financial situation. The initiatives seem to have increased the share of working individuals marginally, but also to have reduced happiness marginally.

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[55]E.g., Green (2007).

Table 13: Impact of faith-based initiatives on income related outcomes

	Panel (a)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Hours of work	Work < 20 hours	Working	Family income	Education	Edu. $>$ high school
Law$_{t-1}$	-0.092	0.011	0.024*	1.15	-0.075	-0.021
	(0.608)	(0.008)	(0.014)	(1.486)	(0.108)	(0.022)
Adj. R^2	0.073	0.018	0.17	0.13	0.097	0.073
N	20952	20952	34895	31283	34826	34826
Mean DV	41.1	0.070	0.62	34.9	12.9	0.48

	Panel (b)			
	(7)	(8)	(9)	(10)
	Satisfied with financial situation	Better financial situation	Happy	Satisfied with job
Law$_{t-1}$	-0.0047	0.0065	-0.018*	0.0014
	(0.013)	(0.012)	(0.010)	(0.008)
Adj. R^2	0.029	0.064	0.028	0.018
N	31506	31456	31392	24845
Mean DV	0.74	0.38	0.89	0.86

OLS estimates. All regressions include year of survey and state fixed effects, and the respondent for age, marital status, and gender. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

6 Conclusion

The faith-based initiatives is a range of laws implemented across the US since 1996. These laws allowed provision of government welfare by faith-based organizations in religious settings, reduced regulations on faith-based organizations, and strengthened the ties between state officials and the church. The initiatives have later been criticized for not providing the promised amount of resources, and sociologists have argued that the strengthened links between state and church may be the most important part of the initiatives.

We document that average attendance at religious services and religious beliefs in general increased in the aftermath of the initiatives. We also find increases in the number of congregations and religious non-profits in general. At the same time, general well-being does not seem to have increased over the same period. It seems that the quest for religious freedom has increased the role played by religion without much gains in well-being of the population. These results are consistent with a study by Bryan *et al.* (2018), who found that random implementation of an evangelical Protestant anti-poverty organization in the Philippines increased religiosity and income, but did not influence total labor supply, assets, consumption, food security, or life satisfaction.

Our results contribute to our understanding of the recent surge in religiosity in some US states and perhaps even other places in the world that have seen surges in evangelicalism. Our results also illustrate how increased state-church cooperation can influence the religious beliefs and practices of the population. At a more general level, our results provide knowledge on how policies can affect individuals' personal values and beliefs.

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Appendix

A Data Description

A.1 The faith-based initiatives

Rebecca Sager collected data on nine types of legislation passed over the period 1996-2007, using key words such as "faith-based" and "Charitable Choice" to determine how many such practices had become incorporated into legislation (Sager (2010), p. 24). Data for each piece of legislation included the date of passage, its sponsor, and the complete text of the bill. Sager coded legislative acts by category and year of passage. LexisNexis was also a source of information on liaison positions that were created by law or an executive order from the governor. This data included the date of appointment, an official description of the position, and the means by which each FBL was appointed.

A.2 The faith-based institutions

The information on FBL and OFBCI used in Table A.24 is based on interviews of officials in all states performed by Rebecca Sager in 2004/2005 revealing whether the state had an FBL and/or an OFBCI, the year of establishment, and their budgets (Sager (2010)). The majority of states had an FBL and an OFBCI at the time of interview, but the timing of their implementation varies across states and a few did not have one yet.

A.3 The GSS Variables

The additional variables from the GSS used in the extensive analyses are presented below. The summary statistics of all variables can be found in Appendix Table A.2.

Afterlife: Variable name: postlife. Question: "Do you believe there is a life after death?" Answers: no, yes

Bible: Variable name: bible. Question: "Which of these statements comes closest to describing your feelings about the Bible?" Answers: "The Bible is the actual word of God and is to be taken literally, word for word", "The Bible is the inspired word of God but not everything in it should be taken literally, word for word", "The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men" (converted to a dummy equal to one if actual word of God)

Pray: Variable name: pray. Question: "How often do you pray?" Answers: several times a day, once a day, several times a week, once a week, less than once a week, never (converted to a dummy equal to one if several times a day)

God: Variable name: god. Question: "Which statement comes closest to expressing what you believe about God?" Answers: "I don't believe in God", "I don't know whether there is a God and don't believe there is a way to find out", "I don't believe in a personal God, but I do believe in a Higher Power of some kind", "I find myself believing in God some of the time, but not at others", "While I have doubts, I feel that I do believe in God", "I know God really exists and I have no doubt about it" (converted to a dummy equal to one if know God really exists)

Religious affiliation: Variable name: relig. Question: "What is your religious preference?" Answers: Protestant, Catholic, Jewish, Some other religion, No religion.

Religion in which raised: Variable name: relig16. Question: "In what religion were you raised?" Answers: Protestant, Catholic, Jewish, Some other religion, No religion.

Switcher: Dummy equal to one if "Religious affiliation" is different from "Religion in which raised"

Fundamentalist: Variable name: fund. No question, but a classification of the affiliation to which the respondent belong

Against homo: Variable name: homosex. Question: "What about sexual relations between two adults of the same sex - do you think it is always wrong, almost always wrong, wrong only sometimes wrong, or not wrong at all?" (converted to a dummy equal to one if the answer is any degree of wrong)

Against abortion: Variable name: abany. Question: "Please tell me whether or not you think it should be possible for a pregnant woman to obtain a legal abortion if the woman wants it for any reason?" Answers: no, yes

Female work. Variable name: fework. Question: "Do you approve or disapprove of a married woman earning money in business or industry if she has a husband capable of supporting her?" Answers: disapprove, approve

Confidence in science: Variable name: consci. Question: "I am going to name some institutions in this country. As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them? Scientific Community" (converted to a dummy equal to one if the answer is great deal of confidence)

Conservative: Variable name: polviews. Question: "We hear a lot of talk these days about liberals and conservatives. I'm going to show you a seven-point scale on which the political views people might hold are arranged from extremely liberal–point 1–to extremely conservative–point 7. Where would you place yourself on this scale?" (converted to a dummy equal to one if answer is conservative or extremely conservative).

Trust: Variable name: trust. Question: "Generally speaking, would you say that most people

can be trusted or that you can't be too careful in dealing with people?" (converted to a dummy equal to one if answer is can trust).

Republican Variable name: partyid. Question: "Generally speaking, do you usually think of yourself as a Republican, Democrat, Independent, or what?" (converted to a dummy equal to one if republican)

Voted: Variable name: presXX. "Now in XX, you remember that YY ran for President on the Democratic ticket against WW for the Republicans, and ZZ as an Independent. Do you remember for sure whether or not you voted in that election?" (XX referring to the year of the most recent presidential election) (converted to a dummy equal to one if yes)

Voted republican: Variable name: presXX. Question: " Did you vote for YY, WW, or ZZ? (converted to a dummy equal to one if answer is the republican candidate)

Hours: Variable name: hrs1. Question: "Last week were you working full time, part time, going to school, keeping house, or what? If working, full time or part time: How many hours did you work last week, at all jobs?"

Working: Variable name: wrkstat. Question: "Last week were you working full time, part time, going to school, keeping house, or what?" (converted to a dummy equal to one if working, full time or part time)

Education: Variable name: educ. Question: What is the highest grade in elementary school or high school that you finished and got credit for? IF FINISHED 9th-12th GRADE OR DK*: Did you ever get a high school diploma or a GED certificate? Did you complete one or more years of college for credit–not including schooling such as business college, technical or vocational school? IF YES: How many years did you complete? Do you have any college degrees? (IF YES: What degree or degrees?) Answer: Integers between 0 - 20.

High education: Variable name: educ. Converted to a dummy equal to one if equal to or above 13 (educational level above high school)

Satisfied with financial situation: Variable name: satfin. Question: "We are interested in how people are getting along financially these days. So far as you and your family are concerned, would you say that you are pretty well satisfied with your present financial situation, more or less satisfied, or not satisfied at all?" (converted to a dummy equal to one if satisfied)

Better financial situation: Variable name: finalter. Question: "During the last few years, has your financial situation been getting better, worse, or has it stayed the same?" Answers: Better, worse, Stayed same. (converted to a dummy equal to one if better)

Happy: Variable name: happy. Question: "Taken all together, how would you say things are these days–would you say that you are very happy, pretty happy, or not too happy?" (converted to a dummy equal to one if very happy or pretty happy)

Satisfied with job: Variable name: satjob. Question: "On the whole, how satisfied are you with the work you do–would you say you are very satisfied, moderately satisfied, a little dissatisfied, or very dissatisfied?" (converted to a dummy if very or moderately satisfied)

A.4 Additional individual level data

Charitable giving. The Consumer Expenditure Survey (CEX) collects data on a nationally representative set of households on their expenditures. The data includes expenditure on charitable giving, among which religious donations have a separate category. The data is collected at household level and the respondents are interviewed throughout the year. Respondents are asked how much they have donated over the past year. There are considerable breaks in the data and we are therefor only using the time period from 1996-2001. The data is in current value USD. Due to a few implausibly large donation amounts, we censor total giving at 99 percent of those donating a positive amount.

Voting behavior. The American National Election Studies (ANES) provide data on voting behavior at the past presidential elections including socio-economic characteristics such as age, marital status, gender, race, and self-identified political opinion. There was however a data break in 1992, which means that our period of analysis starts in 1992 for these data (Ansolabehere *et al.*, 2006).

A.5 Religious congregations and membership

The county and state level data on religious congregations and memberships are provided by the Association of Religion Data Archives (ARDA). We use the longitudinal data set covering the years 1980, 1990, 2000, and 2010. The data covers 302 religious groups, and includes information on total population, religious tradition, number of adherents, and number of congregations.

A.6 Non-profit organizations

The data on non-profit organizations is from the NCCS. The dataset contains the universe of non-profit organizations in the US. Organizations report their purpose on a A-Z scale, including groups such as "Arts, Culture, and Humanities", "Education", and "Religion Related, Spiritual Development". We code the latter as a religious organization. As an additional indicator of a religious organization, we code a dummy equal to one if a religious term enters the name of the organization. These are terms such as "christian", "church", "jewish", "ministry", "catholic", "temple", "christ", "baptist", "lutheran", and "methodist".

A.7 Politicians' religious denomination

The data on the religious denomination of state officials in the Senate or the House of Representatives is from the adherents.com. The dataset holds information on party, faith, chamber, and year for individual state officials. We code state officials as non-religious, when their faith is reported as "unknown" or "unspecified". After aggregating the data to the state-year level, we code a state-year as non-religious if one of the state-officials were non-religious.

A.8 Additional state level variables

GSP per capita: Gross state product per capita. Annual data in constant chained 1997 USD. Source: the Bureau of Economic Analysis (BEA).

Poverty rate: Available in the years 1989, 1993, 1995-2010. The variable used is the percent of population in poverty using all ages. Source: the US Census Bureau, Small Area Income and Poverty Estimates (SAIPE)

Public spending per capita: Covers direct welfare expenditure per capita at the state level. Expenditure on Public Welfare, Health, and Corrections in current USD. Source: US Census Bureau, Annual Survey of State Government Finances and Census of Governments.

Cause of death: State level cause of death data is provided by the Centers for Disease Control and Prevention, U.S: Department of Health and Human Services. The data includes the underlying cause of death in the years 1999-2017.

Crime rates: The data on state level crime rates are provided by FBI, Uniform Crime Reports, prepared by the National Archive of Criminal Justice Data. We use the variable estimated violent crime rate.

B   Additional tables and figures

Figure A.1: Average church attendance depending on the timing of implementation
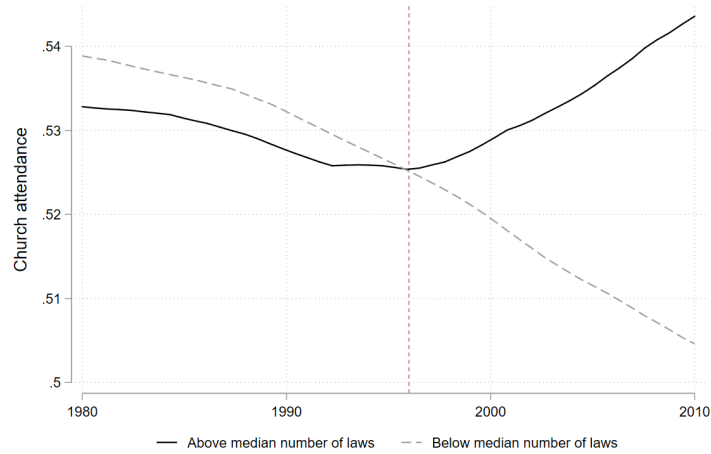
Note: Sample is split into two equally sized groups, depending on the number of laws implemented over the entire period. The lines represent the kernel-weighted local polynomial regression of the weighted state means of attendance rates.

Table A.1: Number of faith-based laws implemented by state over time

	96	97	98	99	00	01	02	03	04	05	06	07	08	09	Total
alabama	0	0	0	0	0	2	0	0	1	2	2	2	3	1	13
alaska	0	0	0	0	0	1	0	0	1	0	0	3	1	0	6
arizona	0	2	0	2	3	0	1	2	3	4	3	4	1	2	27
arkansas	0	0	0	0	0	0	0	0	0	1	0	3	0	1	5
california	0	1	0	1	2	1	0	0	0	1	0	0	1	0	7
colorado	0	0	0	0	3	0	1	0	1	1	0	0	0	0	6
connecticut	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
delaware	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
florida	0	1	2	1	7	6	4	3	4	3	1	3	1	0	36
georgia	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2
hawaii	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
idaho	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2
illinois	0	0	0	0	0	0	0	1	0	1	0	1	0	2	5
indiana	0	0	0	0	0	1	0	3	1	2	1	1	0	4	13
iowa	0	0	0	0	0	1	0	1	1	0	0	0	2	2	7
kansas	0	0	0	0	0	0	0	1	1	0	1	0	0	1	4
kentucky	0	0	1	0	1	0	0	0	0	2	1	0	0	2	7
louisiana	0	0	0	1	0	2	1	1	2	0	2	0	2	1	12
maine	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
maryland	0	0	0	0	0	1	0	2	1	1	2	2	0	0	9
massachu.	0	0	0	0	1	1	1	1	1	0	1	1	1	0	8
michigan	0	1	0	1	1	0	0	2	1	0	0	0	0	1	7
minnesota	0	0	0	0	0	1	0	1	0	0	0	1	1	0	4
missis.	0	0	0	0	0	0	0	2	2	0	1	2	1	3	11
missouri	0	0	0	0	0	0	0	0	1	0	1	1	1	1	5
montana	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2
nebraska	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
nevada	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
new h.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
new jersey	0	0	1	1	1	2	3	1	2	2	2	1	1	4	21
new mexico	0	0	0	0	0	0	0	3	0	1	0	0	1	0	5
new york	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
north c.	0	0	0	0	0	1	0	0	0	2	0	0	2	1	6
north dakota	0	0	0	0	0	0	0	0	0	3	0	1	0	1	5
ohio	0	0	0	0	0	2	0	2	0	4	0	0	0	1	9
oklahoma	0	0	0	0	0	1	3	3	1	0	0	5	2	0	15
oregon	0	0	0	0	0	2	0	1	1	0	0	0	0	1	5
pennsylvania	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
rhode island	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
south carolina	0	0	0	0	0	0	0	0	0	2	1	1	1	0	5
south dakota	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
tennessee	0	0	0	0	0	0	0	0	0	2	2	1	1	2	8
texas	0	1	0	4	0	2	0	3	0	3	0	6	0	7	26
utah	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
vermont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
virginia	0	0	0	0	0	1	2	0	1	0	4	2	1	1	12
washington	0	0	0	0	0	0	0	0	0	0	3	1	1	0	5
west virginia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
wisconsin	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
wyoming	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	0	6	5	11	19	32	17	34	28	38	29	45	28	40	332

Table A.2: Summary statistics GSS variables 1980-2010

Variable	Obs	Mean	Std. Dev.	Min	Max
Attendance	39,355	0.47	0.34	0	1
Strength of affiliation	33,662	0.43	0.50	0	1
Protestant	39,613	0.58	0.49	0	1
Catholic	39,613	0.24	0.43	0	1
No religion	39,613	0.12	0.32	0	1
Married	39,785	0.51	0.50	0	1
Age	39,642	45.80	17.44	18	89
Male	39,785	0.44	0.50	0	1
Black	39,785	0.14	0.35	0	1
Educational level	39,676	13.01	3.09	0	20
Work status	39,773	2.97	2.41	1	8
Believe in afterlife	25386	0.806	0.396	0	1
Bible the word of God	23402	0.331	0.471	0	1
Pray	23391	0.564	0.496	0	1
Know god exists	13401	0.621	0.485	0	1
Fundamentalist	38105	0.317	0.465	0	1
Switcher	40341	0.217	0.412	0	1
Foreign born	38315	0.081	0.273	0	1
Republican	39569	0.265	0.441	0	1
Number of children	39672	1.892	1.754	0	8
Voted Republican	40341	0.276	0.447	0	1
Voted	33395	0.709	0.454	0	1
Against homo	23190	0.763	0.425	0	1
Against abortion	24798	0.587	0.492	0	1
Female work	15168	0.809	0.393	0	1
Confidence in science	23725	0.426	0.495	0	1
Conservative	34879	0.181	0.385	0	1
Trust	25613	0.374	0.484	0	1
Hours of work	24262	41.358	14.324	0	89
Work less than 20 hours	24262	0.067	0.250	0	1
Working	39773	0.613	0.487	0	1
Real family income	35562	31.682	29.554	0	146
Educational level	39676	13.007	3.090	0	20
Educational level above high school	39676	0.490	0.500	0	1
Satisfied with financial situation	35736	0.727	0.446	0	1
Better financial situation	35673	0.377	0.485	0	1
Happy	35603	0.877	0.328	0	1
Satisfied with job	28378	0.856	0.351	0	1

Excluding Texas and Florida

Table A.3: Pre-differences across total number of faith-based initiatives

Characteristic, Y	1980-1994			
	Levels		Changes	
	Raw	Controls	Raw	Controls
	(1)	(2)	(3)	(4)
Attendance	0.000	0.000	0.000	0.000
	(0.000)	-(0.001)	(0.001)	(0.001)
Strength of affiliation	0.000	0.000	-0.001	-0.001
	(0.001)	-(0.001)	(0.002)	(0.002)
Protestant	0.005***	0.00	0.000	0.000
	(0.001)	-(0.001)	(0.001)	(0.001)
Income	-0.182***	0.000	-0.033	-0.002
	(0.047)	-(0.048)	(0.100)	(0.101)
Black	0.001***	0.000	0.000	0.000
	(0.001)	-(0.001)	(0.002)	(0.002)
Educational level	-0.011**	0.000	-0.001	0.003
	(0.004)	-(0.005)	(0.013)	(0.013)
Public Welfare spending	-1.808***	0.403*	-0.340	-0.28
	(0.321)	(0.238)	(0.515)	(0.466)
Age	-0.042		0.002	
	(0.026)		(0.055)	
Married	0.000		0.055	
	(0.001)		(0.000)	
Male	0.000		0.000	
	(0.001)		(0.000)	

Each of the estimates represent the outcome of one OLS regression. Controls include region and year fixed effects, and controls for age, married and male. Robust standard errors in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level. The number of observations in columns (3)-(4) is 429.

Table A.4: Main results for church attendance incl. Texas and Florida

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Frequency of church attendance [0;1]
Law$_{t-1}$	0.027***	0.026***	0.025***	0.025***	0.030***	0.026***	0.024***	0.021**
	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)
Family income			28.9**					
			(13.022)					
Education				0.010***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.000038			
					(0.000)			
Protestant						-0.0044		
						(0.009)		
Black							0.088***	
							(0.006)	
Law$_{t+1}$								0.0093
								(0.013)
Adj. R^2	0.023	0.055	0.056	0.063	0.057	0.055	0.063	0.055
N	38894	38770	34697	38693	33531	38770	38770	38770
Mean DV	0.52	0.52	0.52	0.52	0.53	0.53	0.52	0.52

OLS estimates. All regressions include year of survey, state fixed effects, and col. (2)-(8) also individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.5: Main results for church attendance, incl. the non-affiliated

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Frequency of church attendance [0;1]
Law$_{t-1}$	0.019*	0.019*	0.018*	0.019*	0.023**	0.023**	0.016*	0.0029
	(0.010)	(0.010)	(0.009)	(0.010)	(0.011)	(0.010)	(0.010)	(0.011)
Family income			25.2					
			(16.204)					
Education				0.0089***				
				(0.002)				
Public Welfare spending$_{t-1}$					0.000018			
					(0.000)			
Protestant						0.093***		
						(0.012)		
Black							0.096***	
							(0.005)	
Law$_{t+1}$								0.013
								(0.013)
Adj. R^2	0.036	0.082	0.083	0.088	0.083	0.098	0.090	0.082
N	39355	39227	35200	39152	33464	39138	39227	39227
Mean DV	0.47	0.47	0.47	0.47	0.48	0.48	0.47	0.47

OLS estimates. All regressions include year of survey, state fixed effects, and col. (2)-(8) also individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.6: Main results for church attendance using number of laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Dependent variable: Frequency of church attendance [0;1]					
Number of laws$_{t-1}$	0.0045***	0.0046***	0.0040***	0.0046***	0.0060***	0.0046***	0.0044***	0.0044***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Family income			31.8**					
			(14.711)					
Education				0.011***				
				(0.002)				
Public Welfare spending$_{t-1}$					0.000029			
					(0.000)			
Protestant						-0.011		
						(0.009)		
Black							0.083***	
							(0.005)	
Number of laws$_t$								0.0033
								(0.004)
Adj R^2	0.024	0.056	0.058	0.065	0.058	0.063	0.063	0.082
N	34729	34624	31064	34556	29679	33145	34624	39235
Mean DV	0.52	0.52	0.52	0.52	0.52	0.53	0.52	0.47

OLS estimates. All regressions include year of survey, state fixed effects, and col. (2)-(8) also individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.7: Main results for religious beliefs incl. Texas and Florida

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Dependent variable: Strength of affiliation [0;1]					
Law$_{t-1}$	0.026***	0.027**	0.024**	0.026**	0.032**	0.028**	0.024**	0.029**
	(0.010)	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.010)	(0.011)
Family income			-19.1					
			(11.599)					
Education				0.0076***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.00011***			
					(0.000)			
Protestant						0.017*		
						(0.010)		
Black							0.13***	
							(0.013)	
Law$_{t+1}$								-0.0027
								(0.016)
Adj. R^2	0.014	0.039	0.037	0.041	0.041	0.040	0.047	0.039
N	37705	37587	33665	37515	32521	37587	37587	37587
Mean DV	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43

OLS estimates. All regressions include year of survey, state fixed effects, and col. (2)-(8) also individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.8: Main results for religious beliefs incl. the non-affiliated

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Religious affiliation [0;1]							
Law_{t-1}	0.022**	0.024**	0.018	0.023**	0.029**	0.028**	0.020*	0.018
	(0.010)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.010)	(0.012)
Family income			-18.3					
			(13.178)					
Education				0.0051***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.000077***			
					(0.000)			
Protestant						0.11***		
						(0.013)		
Black							0.13***	
							(0.014)	
Law_{t+1}								0.00092
								(0.015)
Adj. R^2	0.021	0.059	0.056	0.060	0.061	0.070	0.067	0.059
N	38258	38136	34273	38069	32548	38134	38136	38136
Mean DV	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

OLS estimates. All regressions include year of survey and state fixed effects, col. (2)-(8) also and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.9: Main results for religious beliefs using number of laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Religious affiliation [0;1]							
Number of laws$_{t-1}$	0.0026*	0.0027*	0.0027*	0.0026*	0.0043**	0.0027*	0.0024*	0.0029*
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Family income			-19.7					
			(12.992)					
Education				0.0069***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.00010***			
					(0.000)			
Protestant						0.0077		
						(0.009)		
Black							0.13***	
							(0.014)	
Number of laws$_t$								-0.0031
								(0.008)
Adj. R^2	0.015	0.042	0.039	0.044	0.044	0.042	0.050	0.042
N	33660	33554	30136	33490	28779	33554	33554	33554
Mean DV	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43

OLS estimates. All regressions include year of survey and state fixed effects, col. (2)-(8) also and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.10: Main results for church attendance, cluster at state*year

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Frequency of church attendance [0;1]							
Law_{t-1}	0.027***	0.026***	0.025***	0.025***	0.030***	0.026***	0.024***	0.021**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)
Family income			28.9***					
			(7.677)					
Education				0.010***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.000038*			
					(0.000)			
Protestant						-0.0044		
						(0.005)		
Black							0.083***	
							(0.006)	
Law_{t+1}								0.016
								(0.011)
Adj. R^2	0.023	0.055	0.056	0.063	0.057	0.055	0.063	0.055
N	38894	38770	34697	38693	33531	38770	38770	38770

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state*year level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.11: Main results for religious beliefs, cluster at state*year

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Frequency of church attendance [0;1]							
Law_{t-1}	0.026**	0.027**	0.024*	0.026**	0.032***	0.028**	0.024**	0.029**
	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.011)	(0.013)
Family income			-19.1*					
			(11.252)					
Education				0.0076***				
				(0.001)				
Public Welfare spending$_{t-1}$					0.00011***			
					(0.000)			
Protestant						0.017**		
						(0.007)		
Black							0.13***	
							(0.009)	
Law_{t+1}								0.0012
								(0.016)
Adj. R^2	0.014	0.039	0.037	0.041	0.041	0.040	0.047	0.039
N	37705	37587	33665	37515	32521	37587	37587	37587

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state*year level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.12: Pairwise correlation between measures of religiosity

	Attendance	Affiliation	Afterlife	Bible	Praying	God
Attendance	1					
Affiliation	0.5311*	1				
Afterlife	0.1646*	0.1391*	1			
Bible	0.2257*	0.2213*	0.0549*	1		
Praying	0.3485*	0.3335*	0.1305*	0.2175*	1	
God	0.3340*	0.3133*	0.2065*	0.3608*	0.2903*	1

Note: * indicate significance at 1% level

Figure A.2: Marginal effects of faith-based initiatives across income

(a) Church attendance

(b) Strength of affiliation
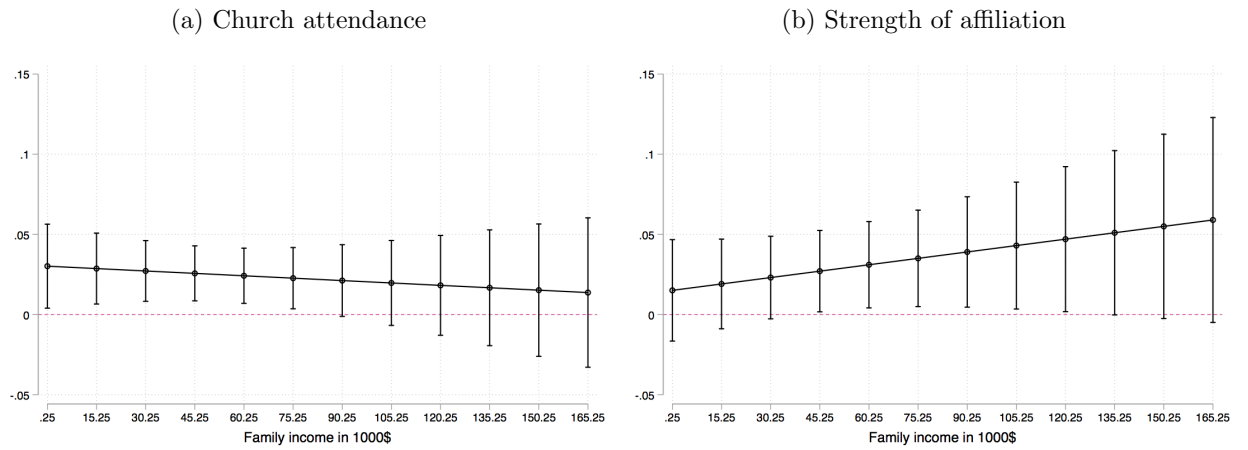
Note: OLS regressions corresponding to column (3) of Tables 3 and 5, including an interaction term with family income.

Table A.13: Effects of different types of laws

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Frequency of church attendance [0;1]				Strength of affiliation [0;1]			
Law_{t-1}	0.019	0.026***	0.026**	0.028***	0.032*	0.040***	0.034***	0.036***
	(0.016)	(0.009)	(0.010)	(0.010)	(0.016)	(0.013)	(0.011)	(0.012)
Symbolic law_{t-1}	0.012				0.0011			
	(0.013)				(0.013)			
Concrete law_{t-1}		0.0030				-0.011		
		(0.011)				(0.016)		
Prison law_{t-1}			0.017				-0.017	
			(0.017)				(0.015)	
Program law_{t-1}				-0.00065				-0.020*
				(0.010)				(0.011)
Adj. ^{2}	0.056	0.056	0.056	0.056	0.042	0.042	0.042	0.042
N	34624	34624	34624	34624	33560	33560	33560	33560

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.14: Heterogeneous effects across regions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Frequency of church attendance [0;1]					Strength of affiliation [0;1]				
$\text{Law}_{t-1}=1$	0.030***	0.031***	0.024**	0.025**	0.034***	0.036***	0.033**	0.029**	0.030***	0.032**
	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)	(0.011)	(0.013)	(0.013)	(0.011)	(0.013)
$\text{Law}_{t-1}=1 \times \text{NE}=1$	-0.015					-0.030**				
	(0.022)					(0.014)				
$\text{Law}_{t-1}=1 \times \text{MW}=1$		-0.011					-0.0015			
		(0.009)					(0.013)			
$\text{La}_w t-1=1 \times \text{W}=1$			0.012					0.010		
			(0.009)					(0.014)		
$\text{Law}_{t-1}=1 \times \text{S}=1$				0.0086					0.0088	
				(0.014)					(0.016)	
$\text{Law} t-1=1 \times \text{Rust}=1$					-0.020*					-0.00056
					(0.011)					(0.013)
r2_a	0.056	0.056	0.056	0.056	0.056	0.042	0.042	0.042	0.042	0.042
N	34624	34624	34624	34624	34624	33560	33560	33560	33560	33560

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.15: Heterogeneous effects of faith-based initiatives I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable:	Frequency of church attendance [0;1]					Strength of affiliation [0;1]				
Law_{t-1}	0.030**	0.084**	0.0034	-0.020	0.019*	0.015	0.016	0.062*	-0.015	0.021*
	(0.013)	(0.037)	(0.029)	(0.015)	(0.010)	(0.016)	(0.035)	(0.036)	(0.015)	(0.012)
Family income	0.36**					-0.29				
	(0.143)					(0.181)				
Income X Law_{t-1}	-0.100					0.27				
	(0.196)					(0.240)				
Education		0.012***					0.0066***			
		(0.001)					(0.001)			
Educational level X Law_{t-1}		-0.0042*					0.0013			
		(0.002)					(0.002)			
Public Welfare spending$_{t-1}$			0.092					1.37***		
			(0.309)					(0.486)		
Public spending$_{t-1}$ X Law_{t-1}			0.34					-0.28		
			(0.304)					(0.423)		
Protestant				-0.033***					-0.015*	
				(0.010)					(0.008)	
Protestant X Law_{t-1}				0.079***					0.080***	
				(0.010)					(0.014)	
Black					0.071***					0.12***
					(0.006)					(0.016)
Black X Law_{t-1}					0.047***					0.062***
					(0.013)					(0.020)
Adj. R^2	0.058	0.065	0.058	0.059	0.064	0.039	0.044	0.044	0.043	0.050
N	31059	34549	29672	34617	34617	30136	33490	28779	33554	33554

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.16: Heterogeneous effects of faith-based initiatives II

	(1)	(2)	(3)	(4)
Dependent variable:	Frequency of church attendance [0;1]		Strength of affiliation [0;1]	
Law_{t-1}	0.019	0.027***	0.029**	0.033***
	(0.012)	(0.010)	(0.013)	(0.012)
Number of laws$_{t-1}$	0.0038**		0.0014	
	(0.002)		(0.001)	
Foreign born		0.038***		0.044***
		(0.013)		(0.012)
Foreign X Law_{t-1}		0.017		-0.037**
		(0.013)		(0.017)
Adj. R^2	0.056	0.058	0.042	0.043
N	34617	33441	33554	32378

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.17: Impact of faith-based initiatives on church attendance, additional individual-level controls

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Frequency of church attendance [0;1]					
Law$_{t-1}$	0.027***	0.028***	0.028***	0.027***	0.028***	0.029***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Employed	0.0090**					
	(0.004)					
Republican		0.063***				
		(0.007)				
Degree			0.029***			
			(0.003)			
Catholic				0.041***		
				(0.007)		
Number of children					0.012***	
					(0.002)	
Foreign born						0.044***
						(0.013)
Adj. R^2	0.056	0.064	0.066	0.059	0.059	0.058
N	34615	34490	34555	34617	34549	33441

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.18: Impact of faith-based initiatives on intrinsic religiosity, additional individual-level controls

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Religious affiliation [0;1]					
Law_{t-1}	0.033***	0.031**	0.033***	0.033***	0.032***	0.029**
	(0.011)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)
Employed	-0.020**					
	(0.008)					
Republican		0.058***				
		(0.010)				
Degree			0.022***			
			(0.004)			
Catholic				-0.041***		
				(0.012)		
Number of children					0.013***	
					(0.002)	
Foreign born						0.032***
						(0.010)
Adj. R^2	0.042	0.045	0.044	0.043	0.044	0.043
N	33553	33432	33493	33554	33491	32378

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.19: Impact of faith-based initiatives on church attendance, additional state-level controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Frequency of church attendance [0;1]							
Law_{t-1}	0.027***	0.027***	0.028***	0.028***	0.027***	0.023**	0.020	0.025**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	(0.012)	(0.011)
Share black$_{t-1}$	0.021							
	(0.021)							
Share protestants$_{t-1}$		-0.0065						
		(0.021)						
Mean family income$_{t-1}$			-27.1					
			(20.163)					
Mean educational level$_{t-1}$				-0.00083				
				(0.001)				
Poverty rate$_{t-1}$					0.0012			
					(0.002)			
GSP$_{t-1}$						-1.72**		
						(0.797)		
State times trends							Yes	
Region times trends								Yes
Adj. R^2	0.056	0.056	0.056	0.056	0.056	0.053	0.057	0.056
N	34617	34617	34617	34617	33260	25050	34617	34617

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.20: Impact of faith-based initiatives on intrinsic religiosity, additional state-level controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Religious affiliation [0;1]							
Law_{t-1}	0.034***	0.031**	0.033***	0.032***	0.033***	0.024**	0.022	0.024
	(0.012)	(0.012)	(0.011)	(0.011)	(0.010)	(0.011)	(0.016)	(0.015)
Share black$_{t-1}$	-0.066							
	(0.042)							
Share protestants$_{t-1}$		-0.033						
		(0.030)						
Mean family income$_{t-1}$			-86.0					
			(56.106)					
Mean educational level$_{t-1}$				-0.0020				
				(0.002)				
Poverty rate$_{t-1}$					0.0028			
					(0.003)			
GSP_{t-1}						-2.59**		
						(1.096)		
State times trends							Yes	
Region times trends								Yes
Adj. R^2	0.042	0.042	0.042	0.042	0.042	0.037	0.042	0.042
N	33554	33554	33554	33554	32214	24242	33554	33554

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.21: Impact of faith-based initiatives on religious attendance, initial levels

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Frequency of church attendance [0;1]					
Law_{t-1}	0.027***	0.027***	0.027***	0.027***	0.025***	0.032***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Attendance$_{1980}$ X Year	-0.0073***	-0.0069***	-0.0074***	-0.0070***	-0.0087***	-0.0072***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Black$_{1980}$ X Year		0.0024				
		(0.002)				
Education$_{1980}$ X Year			-0.000065			
			(0.000)			
Income$_{1980}$ X Year				1.92		
				(2.739)		
Protestants$_{1980}$ X Year					0.0013	
					(0.001)	
Pub. spend. cap.$_{1980}$0 X Year						0.0000088**
						(0.000)
Adj. R^2	0.056	0.056	0.056	0.056	0.056	0.058
N	34543	34543	34543	34543	34543	31857

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.22: Impact of faith-based initiatives on intrinsic religiosity, initial levels

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Strength of affiliation [0;1]					
Law_{t-1}	0.032***	0.032***	0.032***	0.032***	0.031***	0.038***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)
$Affiliation_{1980}$ X Year	-0.0088***	-0.0091***	-0.0082***	-0.0086***	-0.0082***	
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Black_{1980}$ X Year		0.0026				
		(0.003)				
$Education_{1980}$ X Year			-0.00030			
			(0.000)			
$Income_{1980}$ X Year				1.21		
				(3.165)		
$Protestants_{1980}$ X Year					0.00043	
					(0.002)	
Pub. spend. cap.$_{1980}$0 X Year						0.0000085
						(0.000)
Adj. R^2	0.042	0.042	0.042	0.042	0.042	0.043
N	33488	33488	33488	33488	33488	30886

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.23: Impact of faith-based initiatives on the size of religious groups

	(1)	(2)	(3)	(4)	(5)	(6)
	Protestant	Catholic	Other religion	Fundamentalist	Switcher	No religion
Law_{t-1}	-0.0346**	0.00951	-0.00156	-0.00828	0.0191**	0.00723
	(0.013)	(0.013)	(0.007)	(0.016)	(0.008)	(0.008)
Adj. R^2	0.163	0.0983	0.0266	0.151	0.0813	0.0624
N	39486	39486	39642	37983	39642	39486
Mean DV	0.570	0.254	0.0421	0.315	0.218	0.115
Mean change in DV	-0.176	-0.009	0.058	-0.085	0.169	0.127

OLS estimates. All regressions include year of survey and state fixed effects, individual baseline controls, and the initial level dependent variable interacted with time. The sample includes also the ones with no affiliation in all columns. The variable Switcher indicates that the current religious affiliation is different from the religion in which the respondent was raised. The variable Fundamentalist indicate whether the respondent belongs to a denomination categorized as fundamentalist. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.24: Impact of central faith-based institutions on religiosity

	(1)	(2)	(3)	(4)
Dependent variable:	Church attendance		Strength of affiliation	
FBL_{t-1}	0.025***	0.026***	0.038***	0.033**
	(0.006)	(0.006)	(0.013)	(0.013)
$OFBCI_{t-1}$		-0.0098		0.055**
		(0.020)		(0.024)
Adj. R^2	0.056	0.056	0.042	0.042
N	31670	31670	30754	30754

OLS estimates. All regressions include year of survey and state fixed effects, and individual level controls age, male, married. The data period is from 1980 to 2006. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.25: Impact of faith-based initiatives implemented in neighbour states

	(1)	(2)
Dependent variable:	Attendance	Affiliation
Law_{t-1}	0.025***	0.029***
	(0.009)	(0.010)
Law neighbour$_{t-1}$	0.0100**	0.014**
	(0.004)	(0.005)
Adj. R^2	0.056	0.042
N	34617	33554
Mean Dep var	0.52	0.43

OLS estimates. All regressions include year of survey and state fixed effects, and individual level controls age, male, married. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.26: Impact of faith-based initiatives on cultural attitudes

	(1)	(2)	(3)	(4)	(5)	(6)
	Against homo	Against abortion	Female work	Confidence in science	Conservative	Trust
Law_{t-1}	0.033**	-0.0042	0.0010	-0.029**	0.016	-0.042**
	(0.014)	(0.014)	(0.027)	(0.013)	(0.012)	(0.017)
Adj. R^2	0.10	0.039	0.043	0.021	0.12	0.051
N	20543	21972	13663	20930	34905	22454
Mean DV	0.80	0.62	0.81	0.42	0.29	0.38

OLS estimates. All regressions include year of survey and state fixed effects, and respondent controls for age, marital status, and gender. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.27: Impact of faith-based initiatives on voting behavior using GSS

Dependent variable	(1) Voted republican	(2) Voted
Law$_{electionyear-1}$	-0.017	0.0071
	(0.018)	(0.015)
Adj. R^2	0.10	0.071
N	34897	29509

OLS estimates. All regressions include year of survey and state fixed effects, and respondent controls for age, marital status, and gender. The laws are now lagged one year compared to the last election year. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table A.28: Impact of faith-based initiatives on voting behavior using ANES

Dependent variable	(1) Voted republican	(2) Conservative	(3) Voted
Law$_{electionyear-1}$	0.00059	-0.036	-0.014
	(0.045)	(0.035)	(0.041)
Adj. R^2	0.084	0.045	0.063
N	8251	9887	12772

OLS estimates. All regressions include year of survey and state fixed effects, and individual baseline controls. Robust standard errors clustered at the state level in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Chapter 3

Global Values:

Developments in Cultural Inequality

Jeanet Sinding Bentzen, Anne Sofie Beck Knudsen, and Lena Lindbjerg Sperling

Global Values:

Developments in Cultural Inequality

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Abstract

In this paper we examine whether people of the world become more alike or dissimilar
in terms of their cultural values. Using data from the World Values Survey and European
Values Study, we find that between 1920 and 1989 country of residence has explained
a decreasing share of the global variation in hard work, a constant share of most other
values, and an increasing share of religiosity and obedience. Focusing on religiosity we
find that as the global inequality has been stable, within country inequality has decreased.
This development corresponds to the development in income inequality. The increasing
cross-country inequality in religiosity is driven by increasing numbers of Hindus and Mus-
lims, with high levels of religiosity, compared to Christians and other religions. We find
no differences in the development across socioeconomic characteristics such as city size,
educational level, or income. There are regional differences with South East Asia being
the main contributor to the increased between-country inequality.

1 Introduction

A considerable part of the public debate on globalization concerns the evolution of cultural values. On the one hand, one would expect people to become more alike across national borders as human interaction becomes more widespread and wide reaching. On the other hand, migrants of different cultural norms are believed to contribute to cultural diversity in migrant-receiving locations, and people have been divided into winners and losers of globalization to explain rising populist and polarizing trends. We know that cultural values not only impact human behavior, but that cultural diversity also matters greatly for economic and political outcomes. Understanding whether people of the world culturally are becoming more alike or dissimilar is therefore of great relevance.

In this paper we empirically analyze the variation in cultural values across countries relative to the variation within countries. We propose a simple test to distinguish between these: If the world is becoming culturally more homogeneous across countries, the importance of country fixed effects in explaining global cultural variation should fall over time. If, instead, people are becoming increasingly different across countries, the explanatory power of countries should, ceteris paribus, increase over time. To investigate whether country fixed effects explain more or less of the global variance in cultural values, we use data from the pooled World Values Survey and European Values Study (WVS and EVS), which consists of surveys of a total of 505,048 individuals in 111 countries across the globe. Interviews were conducted in six waves over the period 1981-2014 allowing us extend the analysis to 1920, and hold information on socio-economic and demographic characteristics together with data on respondents' stated cultural values and beliefs. The data has earlier been used in influential papers on the relationship between culture and economic development, see for example Alesina & Angeletos (2005) and Greif & Tabellini (2010). We use a series of questions, where the respondents rate whether a list of qualities are especially important to pass on to ones' children. The qualities are independence, hard work, feeling of responsibility, imagination, tolerance and respect for other people, thrift/saving money and things, determination/perseverance, religious faith, unselfishness, and obedience.

A priory it is not clear if we should expect global cultural values to be more or less correlated with country fixed effects. Some argue that economic development will lead to a convergence of

cultural values across the globe (Inglehart & Baker (2000)). In this school of thought following the early, and controversial, work of Fukuyama, Fukuyama (1989), the rest of the world will converge towards the Western ideas due to its rationalization and efficiency (Pieterse *et al.*, 2015). This would result in a larger global emphasis on values such as independence and determination (Inglehart & Baker, 2000) and a decline in the importance of more traditional values. In terms of religion this corresponds to the secularization hypothesis stating that as income grows religiosity will decline. Others argue for persistence of traditional values (Hamilton (1994)) such as religious faith and obedience. Within this school of thought De Mooij & Hofstede (2002) find that the manifestation of value differences becomes stronger as income converges. In addition are the values thrift and hard work included as they are believed to be correlated with economic behavior (Granato *et al.*, 1996), if not directly with economic growth (Gorodnichenko & Roland, 2011). In view of the different characteristics of values and what they represent it is likely that the degree to which they have become global values differ. As can be seen in Figure 1 the inequality of the three values independence, religious faith, and hard work is very different for the most recent data in the sample. Hard work is a strong value in most countries, independence is almost normally distributed, and religion has a more humped distribution indicating strong cross-country inequality. One contribution of this paper is to increase our understanding of the development towards these highly different distributions.

Figure 1: Distribution of country means of independence, religious faith, and hard work for the cohorts born in the 1980's
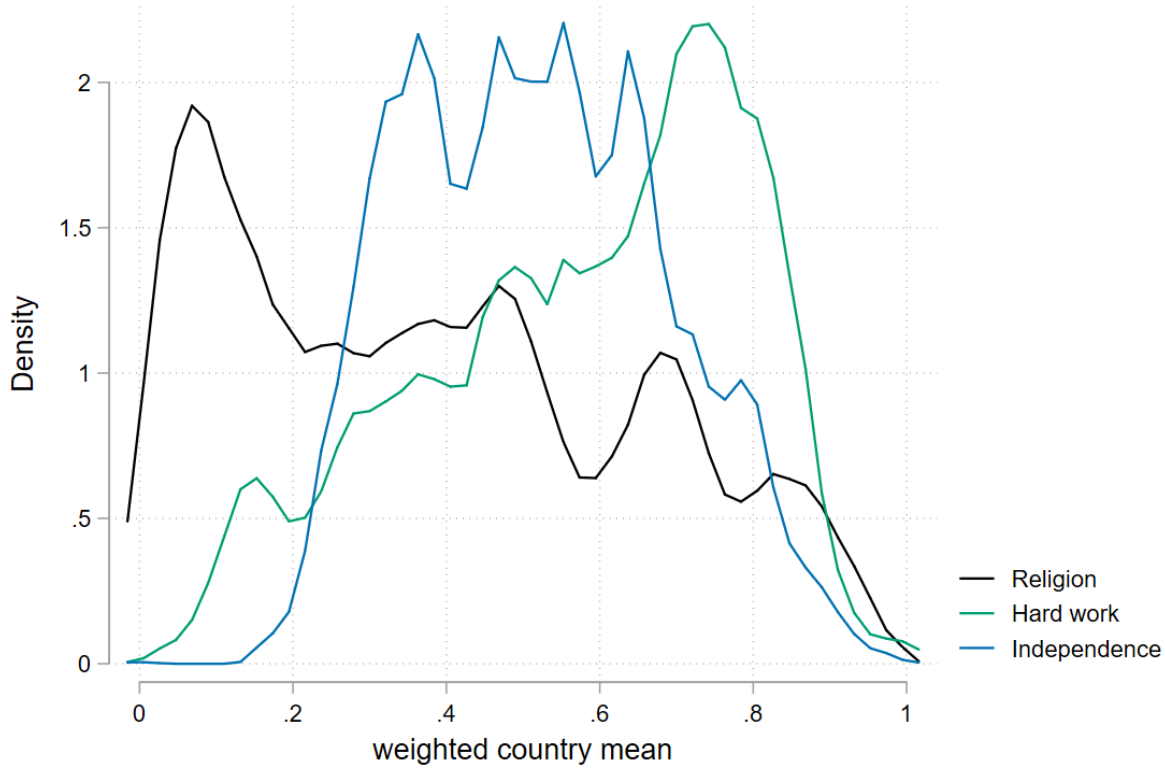
Data source: WVS/EVS 1981-2014

Note: The countries represented here are the 76 countries with at least ten observations in each birth year decade from the 1920's to the 1980's. See appendix table A.1

In order to measure cultural values over time, we attach a survey response in the WVS and EVS to the respondent's birth year. We hereby assume that an individual's values are closely correlated with the values of it's birth year. In light of the literature on cultural transmission from parents and persistence in values (Dohmen *et al.*, 2011), (Bisin & Verdier, 2011) and (Knudsen, 2018) among others, this seems like a reasonable assumption. To investigate the explanatory power of countries, we run regressions of the particular dimensions of cultural values on a full set of country fixed effects for each birth year. We then plot the adjusted R^2 of the regression. Each dot represents one regression. The more recent waves include more countries compared to the earlier waves, which may in itself influence R^2. We therefore restrict

the sample to include only countries that are represented with at least 10 unweighted individuals for each birth year decade.

For most of the cultural values investigated, a rather low and constant share (6-12 pct) of the variation in the culture dimensions can be explained by country fixed effects alone. This is the case for independence, feeling of responsibility, imagination, tolerance and respect for other people, thrift/saving money and things, determination/perseverance, and unselfishness. This seems to indicate that average individuals have been rather similar across countries in terms of these cultural values over the period of analysis of nearly 80 years. There are, however, three trends that jump out: Differences across countries in the extent to which individuals emphasize the importance of hard work is falling over the period. At the other extreme, cross-country differences in the importance of faith and obedience are rising. It seems that countries are becoming more similar in terms of economic values, but more diverse in terms of traditional values, such as religion and emphasis on obedience. We find similar trends using alternative questions on cultural values.

A fall in the explanatory power of countries can indicate one of two things: Either cross-country differences have declined or within-country differences have increased. We distinguish between the two by analyzing the Gini-coefficient for within country inequality and the Theil index for separating the total, between-, and within-country inequalities. The results of the R^2 analysis are supported by density plots of the country means of values over time. In the more thorough analysis we focus on the value of religiosity, as this is were we find the most striking development of increased cross-country inequality.

One concern is that the results are driven by life cycle effects: Perhaps people become more or less alike with age. This does not seem to be the case: adding age fixed effects does not alter our conclusions. Another concern is that more individuals are included in the more recent waves, which might influence R^2. The results are unchanged when restricting the samples to similar size across decades.

Our results show that while within country inequality in the values independence and hard work has increased, it has decreased slightly for religiosity. Cross-country inequality in religiosity has on the other hand increased, whereas it has been stable and declining for independence and hard work respectively. The increased cross-country inequality can to some degree be explained by increasing inequality in religion within the South East Asian countries. While there

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are almost no differences across socio-economic characteristics such as income, educational level, and living in a major city, we see large differences across religious denominations. Increases in the religiosity level of Hindus (i.e. a larger share choosing religious faith as an important child quality) increases the religiosity level in India. Just as the highly religious Muslim country Indonesia experienced religiosity increases. As China continues to be one of the countries in the world with the lowest levels of religiosity, these developments spur the global inequality in religion.

Section 2 presents the related literature on cultural values across the globe, and the development in inequality. Section 3 presents the data, and Section 4 specifications and main results. In section 5 we focus on the value of religiosity and investigate heterogeneity across world regions, socio-economic groups, and religious denominations. Finally section 6 concludes.

2 Related Literature

This section reviews the existing literature on the development of differences in cultural values over time and relate our study to the general economic inequality literature. The purpose of the section is to provide the background of the empirical analysis and to guide the selection of cultural values in focus.

Minkov & Hofstede (2012) investigate the degree to which cultural values cluster across or within national borders. They choose three groups of cultural values from the fifth wave of WVS/EVS, analyzing the cross-sectional differences within one time period. The first group of values includes what respondents regard as important qualities for children to learn. These are the values that we focus on in this paper. The second group of values are referred to as personal values, where respondents evaluate the importance of family, friends, leisure, politics, work, and religion to their own lives. The third group of values includes are found through are set of questions developed by Schwartz (2003), where respondents are asked if they identify with someone for whom it is important to think up new ideas and be creative, be rich, live in secure surroundings, have a good time, help people nearby, be successful, be adventurous and take risks, behave properly, look after the environment, or value tradition. The study finds that whereas sub-national districts tend to form culturally homogeneous and distinct national clusters, individuals cannot be sorted in to national clusters.

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Taras *et al.* (2016) conduct a meta-analysis of 558 studies using Hofstede (2001)'s cultural values, including individualism, power distances, masculinity, and uncertainty avoidance. They find that 80 % of the global variation in these cultural values lies within country borders. This corresponds well with our findings for the majority of our measures of cultural values, but does not correspond with the development for religion. Taras *et al.* (2016) also find that socio-economic classes, occupations, and living in a free versus oppressed country are better predictors of differences in cultural values across time and study than country borders. Their analysis is conducted for only 32 countries, however. Exploiting variation within 76 countries, we find that country borders are better predictors of variation in all our cultural values than any of the socio-economic variables, see Appendix Table A.4.

Last, we relate to a growing literature on diversity and its consequences in economics. This includes studies on ethnic and genetic diversity (Easterly & Levine (1997), Spolaore & Wacziarg (2009), and Ashraf & Galor (2013)). Similarly, we relate to the literature investigating whether global income inequality has risen or fallen over the past decades. Providing a thorough review of this literature, Anand & Segal (2008) conclude that there is insufficient evidence to determine whether global interpersonal inequality has risen or fallen in recent decades.

3   Data

To measure cultural values across the globe, we use the pooled World Values Survey and European Values Study (Inglehart *et al.*, 2014). These surveys have each been conducted in six waves over the period 1981-2014. The surveys hold numerous questions on cultural values, but a specific series of questions is suitable for our purpose. The respondents are asked *"Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five"*. The listed qualities are: Independence, hard work, feeling of responsibility, imagination, tolerance and respect for other people, thrift (saving money and things), determination and perseverance, religious faith, unselfishness, and obedience. We focus on three of these qualities to represent traditional values, secular/rational values, and economic values as suggested by Inglehart & Baker (2000) and Granato *et al.* (1996): Independence, religious faith, and hard work. Evidence on the remaining child qualities are shown in the appendix when relevant.

Table 1 shows the summary statistics for the data used in the main analysis of the paper.

Summary statistics for additional variables used in appendix checks can be found in Appendix Table A.2. Our three main dependent variables take on the value one if the given child quality is mentioned by the respondent as being important and zero otherwise. In addition, we use information on the socioeconomic status of the respondent, which includes dichotomous indicators for having a higher education, living in a major city, and having a high level of income.[1] Other measures of religiosity that we use in later analyses are also listed in the table.[2]

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[1]These are a dummy variable for an educational level above secondary school, a dummy variable indicating whether the city of residence has a population above 500,000, and a dummy for whether the respondent has an income in the top five income groups of its country of residence.

[2]These are: Do you seek comfort in religion? (Yes/No), How important is God in your life? (scale from 1-10 where 1 is not important at all and 10 is very important), Do you believe in God? (Yes/No), Do you see yourself as a religious person? (scale from 1 (convinced atheist) to 3 (religious person)), How often do you attend religious services? (scale from 1 (never or practically never) to 8 (more than once a week)). The last important variable is the denomination of the respondent. We here merge denominations together to the main six categories; Buddhism, Christianity, Hinduism, Islam, and other.

Table 1: Summary statistics of main variables

	Full sample			Restricted sample		
	Observations (millions)	Mean	Std. Dev.	Observations (millions)	Mean	Std. Dev.
Independence	28,444	0.521	0.500	26,570	0.523	0.499
Trust	27,235	0.368	0.482	25,432	0.371	0.483
Faith	27,112	0.326	0.469	25,238	0.314	0.464
Birth year	28,562	1959	18	26,772	1959	16
Age	28,562	40.593	15.700	26,772	40.555	14.815
Male	28,466	0.510	0.500	26,595	0.511	0.500
High education	24,323	0.299	0.458	22,788	0.294	0.456
Major city	21,472	0.237	0.425	20,265	0.239	0.426
High income	24,877	0.327	0.469	23,208	0.328	0.470
Comfort in religion	14,568	0.681	0.466	13,853	0.677	0.467
Importance of God	24,715	6.771	3.343	22,946	6.722	3.360
Believe in God	18,020	0.830	0.375	16,507	0.829	0.376
Religious person	25,453	2.528	0.655	23,738	2.514	0.660
Church attendance	24,421	4.466	2.631	22,637	4.426	2.634
Denomination	25,371	1.992	1.523	23,600	1.956	1.536

Notes: Weighted summary statistics of variables used in the main analyses of this paper. The restricted sample represents respondents born between the years 1920 and 1989 in countries with at least 10 observations in each birth year decade. This represents our baseline sample.

To analyze cultural values over time, we attach a survey response to the respondent's birth year. We hereby assume that an individual's cultural values are closely correlated with the predominant values of his or her birth year. In light of the literature that documents how attitudes, preferences, and beliefs to a large extent are formed in childhood and early adulthood ((Dohmen *et al.*, 2011), (Bisin & Verdier, 2011) and (Knudsen, 2018) among others), this seems like a reasonable assumption. In the following empirical analysis we also check that our results are not driven systematically by age differences. We restrict the sample to the birth years

between 1920 and 1989 in order to have at least 1500 observations in each birth year across countries.

Following the above assumption, each wave of the EVS and WVS can be seen as a repeated cross section over time of individuals in a specific country. Of course, the number of respondents change across age groups. To make sure that our analysis is not impacted by the exit and entry of specific countries over time, within a given survey wave, we further restrict the sample to countries with at least 10 observations in each birth year decade between 1920 and 1989. This gives us a sample that represents a population of around 25 billion in 90 countries across the globe. Appendix Table A.1 shows a list of these countries.[3] This restricted sample will be our main sample of analysis unless otherwise stated.

To illustrate the global developments in the value of independence, hard work, and religiosity, Figure 2 Panel (a) and (b) show the world means of these values across birth years from the pooled EVS and WVS waves, where countries are weighted equally or by their populations, respectively.[4] If we focus on the global averages in Figure 2 Panel (a), where each country is treated with equal weights, then it appears that religiosity and hard work are declining values, whereas independence is increasing. Focusing instead on the global averages in Figure 2 Panel (b), where countries are weighted by their populations, we again see an increasing emphasis on independence, but also on hard work. This indicates that especially hard work is becoming a more important value in relatively more populous nations. Religiosity appears to have been declining from 1920 to 1950 and increasing thereafter.

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[3]It is not possible to perform the analysis based on the year of interview, as there are only 10 countries with information in every wave. These countries are Argentina, Germany, Japan, South Korea, Mexico, Netherlands, South Africa, Spain, Sweden, and United States.

[4]We use the population weights provided by the WVS at www.worldvaluessurvey.org

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Figure 2: Global cultural means over time

(a) Equal country weights
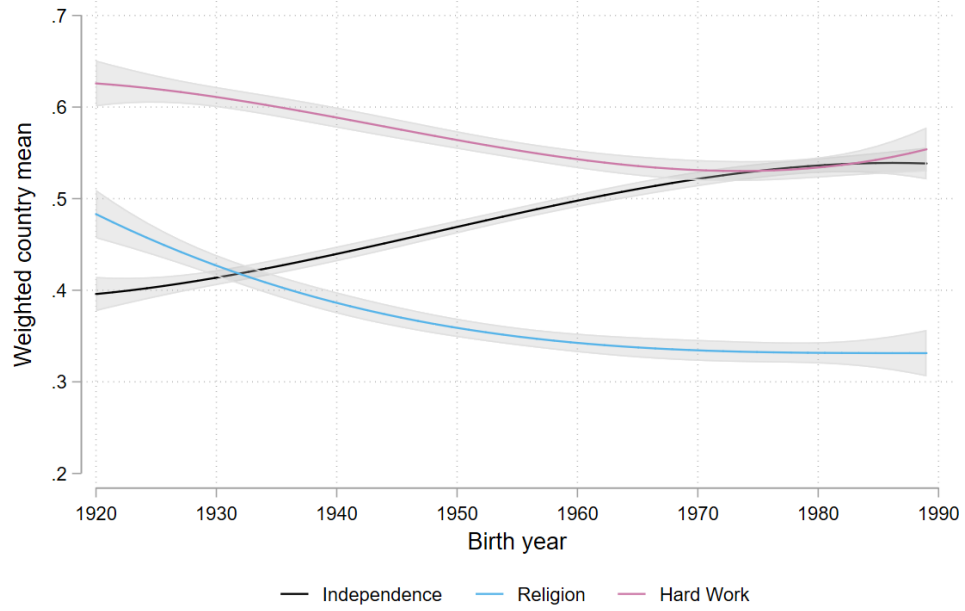
(b) Country population weights
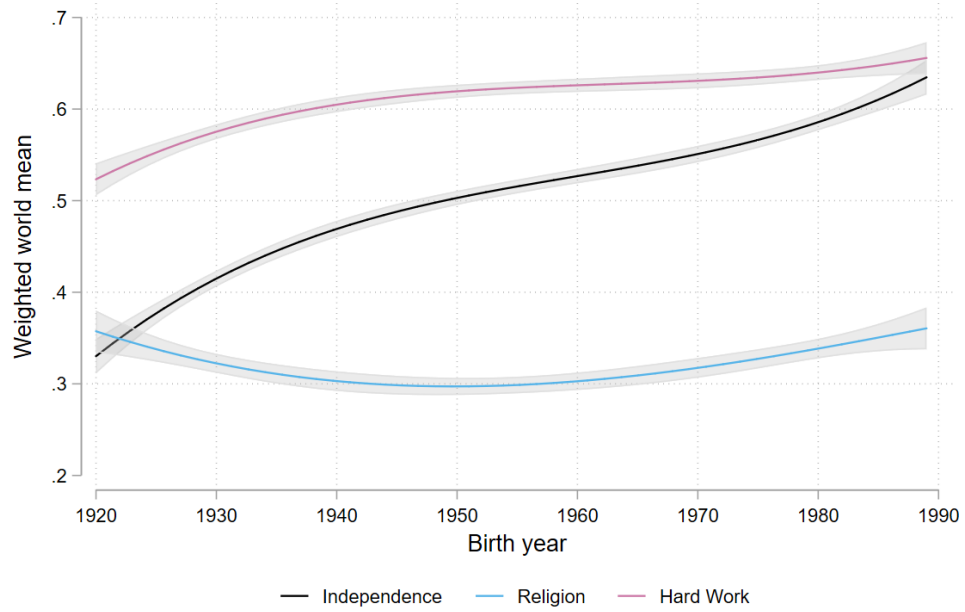
Note: The graphs show non-parametric fits of weighted country means across birth year. The 95 %-confidence bands are calculated using a local polynomial smooth method. Panel (a) Countries are given equal weight, irrespective of population size. Panel (b) Countries are weighted with population size.

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4 Baseline Results

We start our analysis by investigating the degree to which the global variance in parents'
emphasis on independence, hard work, and religiosity in child rearing can be explained by the
respondents' country of residence. To investigate this over time, we estimate the following
regression model:

$$value_{itc} = \gamma_0 + \kappa_c + \varepsilon_{itc}, \tag{1}$$

where $value_{itc}$ is one of the three cultural values measured in the pooled EVS and WVS for
individual i with birth year t and interviewed in country c. The regression is run for each birth
year from 1920 to 1989. We then plot the adjusted R^2 over time.[5] A larger adjusted R^2 indicates
that a larger share of the global variation in the particular cultural value can be explained by
the set of country dummies. The main sample includes only countries that are represented in
all birth year decades. Since the number of countries can vary slightly across birth years within
each decade, we use the adjusted R^2 instead of the unadjusted R^2. The adjusted R^2 takes the
number of predictors in the model into account, and does thus not increase with additional
countries unless they improve the fit of the model. An additional benefit of the adjusted R^2 is
that it provides an unbiased estimate of the population R^2, which is more precisely estimated
with a larger sample (Minitab (2014)). The adjusted R^2 however still depends positively on
the number of observations in each sample[6].

Figure 3 shows the share of the variation in cultural values that can be explained by country
fixed effects. Each dot represents the adjusted R^2 of one regression for a particular birth year.
Focusing first on the emphasis on independence, the explanatory power of countries lies around
10 percent and is pretty stable over time. Second, countries explain a declining share of the
variation in a belief in hard work, and an increasing share in religiosity[7]. This means that
the cultural inequality between countries in the valuation of hard work and religion is falling
and increasing, respectively, compared to the global cultural inequality. These represent very

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[5]All plots use the kernel-weighted local polynomial smoothing. We use the epanechnikov kernel and the
lowest degree, which gives the best fit. The confidence bands are at 95 percent level.

[6]The adjusted R^2 is derived using the formula: $Adj.R^2 = 1 - ((n-1)*(1-R^2))/(n-k)$ increasing in n.

[7]These patterns are also supported by density plots in Appendix Figure A.1 of country level emphases on
independence, religious faith, and hard work for various birth year decades

different developments. It is also noteworthy, that the majority of global variation in these cultural values cannot be attributed to country specific characteristics.

Figure 3: R^2 of country fixed effects across birth years
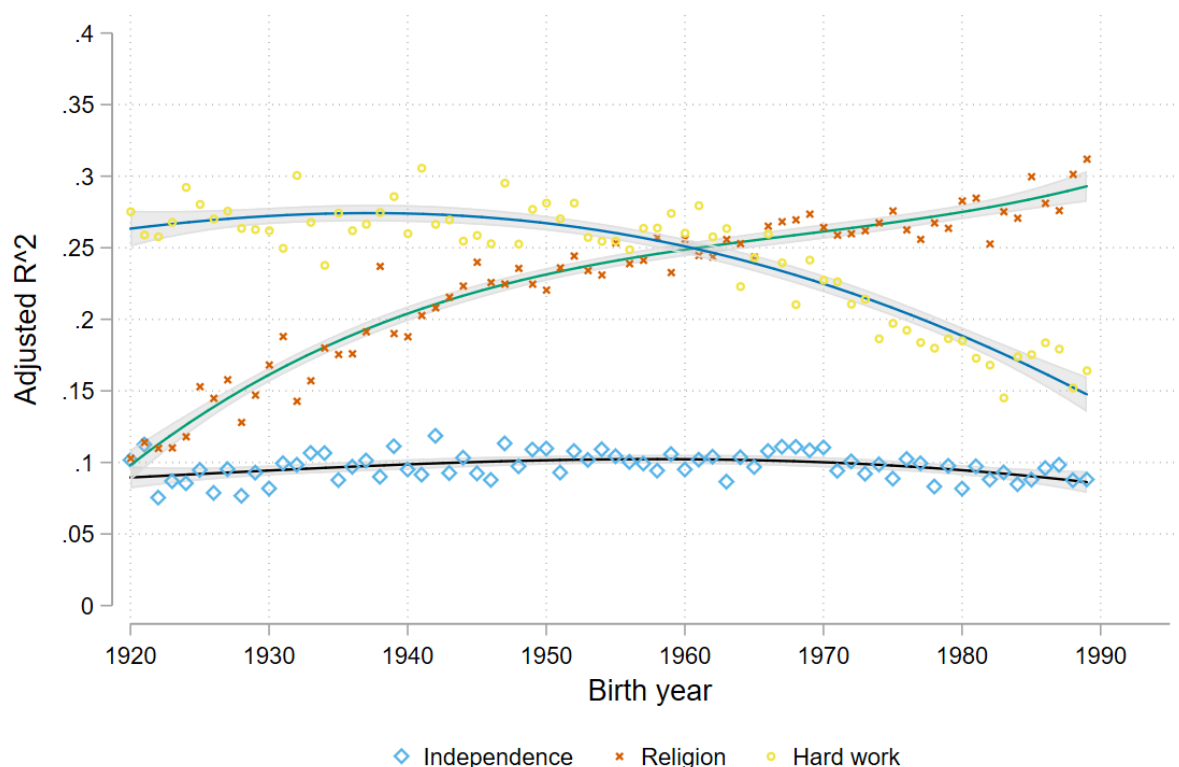

Note: R^2 of regressions of each dimension of culture for each birth year. Each dot represents one regression. Weights included. The 95 %-confidence bands are calculated using the local polynomial smooth method.

The regressions underlying Figure 3 above were run on the baseline sample, where only birth years between 1920 and 1989 were included as well as countries with at least 10 observations in each birth year decade. Appendix Figure A.2 illustrates the results of using the unrestricted EVS and WVS samples. While the confidence bands broaden in birth years outside our baseline period, the depicted developments resemble the above. The same picture also arises in Appendix Figure A.4, when running the regressions on a random sample of 3000 observations in each birth year, which means that the results are not driven by a change in the number of observations.

Evidence on the remaining cultural values on the EVS/WVS module on desirable child qualities are shown in the Appendix A.3. The explanatory power of countries is below 10

percent for all of these, whereby religious faith and hard work are the two values where country fixed effects explain the largest share of the global variation. The only cultural value within this subset to show clear non-stable evolution over time is the emphasis on obedience in child rearing, where country characteristics explain an increasing share of the global variation. Using the alternative cultural values of personal values as in Minkov & Hofstede (2012) corroborate our conclusion that country differences increase for traditional values, but diminish for modern values (Appendix A.5).

Of course, age and birth year are closely correlated, which makes it difficult to assess whether the results in Figure 3 represent developments over time or simple life cycle effects. To ensure that the developments are not results of life cycle changes in cultural values, we first regress each cultural dimension on age and EVS/WVS wave fixed effects. This removes any systematic differences across age groups and interview rounds. Thereafter, we regress the resulting residuals on country fixed effects as in equation (1). Figure 4 shows that this does not alter the results.[8]

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[8]In addition we perform the test in the opposite direction, regressing first on birth year fixed effects and then afterwards on country fixed effects across age. The resulting R^2s are presented in Appendix Figure A.6 and show that the documented trends do not reflect life cycle changes.

Figure 4: R^2 of country fixed effects across birth years: Removing age and wave fixed effects
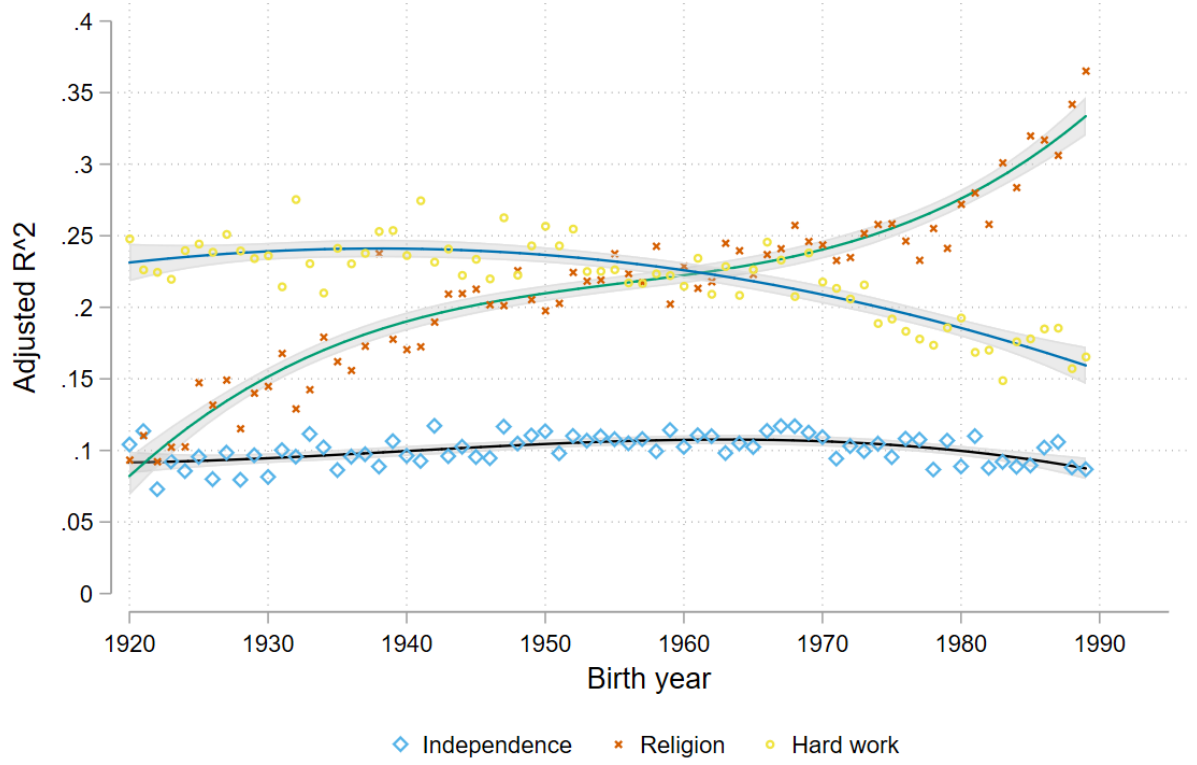
Note: Each cultural value is first regressed on age and wave fixed effects. The residuals are then saved and regressed on country fixed effects as in equation (1) for each birth year. Each dot represents the R^2 of one regression. Weights included. The 95 %-confidence bands are calculated using a local polynomial smooth method.

4.1 Within-Country Cultural Inequality

Changes in the explanatory power of country fixed effects can either be explained by cross-country or within-country dynamics. To examine whether country-specific developments are the driving force behind the above results, we calculate country level Gini-coefficients for each of the three cultural dimensions across birth years.

The Gini-coefficients are calculated as:

$$G_c = \frac{\sum\limits_{i=1}^{n} \sum\limits_{j=1}^{n} |x_i - x_j|}{2n \sum\limits_{i=1}^{n} x_i} \tag{2}$$

where n is the total population in the country c of individual i and j, and x is the individual's response regarding which qualities they view as important in child rearing. As the responses are recorded as binary variables, the maximum cultural inequality within countries is obtained when the population is split in half on the specific cultural dimension. As we here study within-country inequality, each country has a weight of one, regardless of the population size.

Figure 5 illustrates the global development in country level Gini-coefficients over time. Within-country inequality in religious faith has been relatively constant over the period, meaning that this can not explain the increased R^2 of country fixed effects. Both hard work and independence have experienced an increase in within-country inequality. The decreasing explanatory power of country fixed effects in terms of the value hard work can thus be attributed to larger disparities within countries.

Figure 5: The development of within country inequality
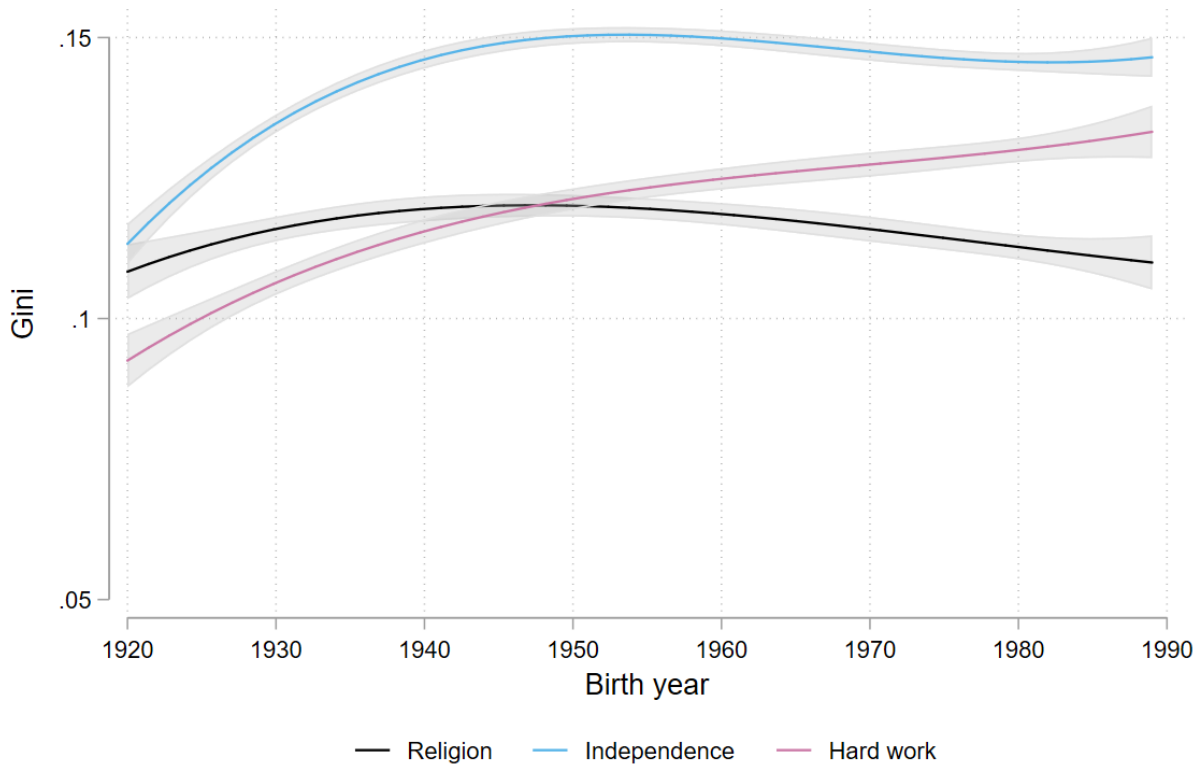
Note: The gini-coefficient is calculated using population weights. In this representation each country has equal weight. The 95 %-confidence bands are calculated using a local polynomial smooth method.

Developments in within-country cultural inequality cover different trends across countries. For religiosity there is a clear positive correlation between the level of religiosity and the change in inequality in religiosity between the 1920s and the 1980s as can be seen from Appendix Figure A.7. Here, we see that Western European countries with the lowest levels of religiosity also became more alike, internally. On the other end of the scale are the MENA countries, which are mainly represented with high levels of religiosity and large increases in within-country inequality in religiosity. The same positive relationship between initial level and change in within-country inequality is evident, though less strong, for the value of hard work. Here, Western European countries also dominate with low values, and almost no change in inequality. For independence we see the opposite relationship between levels and changes, where a lower value indicates inequality increases – as if the world is converging towards the level of Western countries.

5   Further Results on Religiosity

In the analysis of the development in cultural inequality, religiosity stands out as the dimension where global inequality has increased over time, and this cannot be explained by increasing within-country inequality. We will therefor proceed to explore the underlying mechanisms behind the global divergence in the importance of religious faith.

Figure 6 confirms that the increase in cross-country variation in religiosity is strong also with measures based on other interview questions. This indicates that the emphasis on religious faith as an important child quality really is capturing the general religiosity level of the respondent.

Figure 6: R^2 of country fixed effects across birth years - religiosity

(a) Comfort and Importance
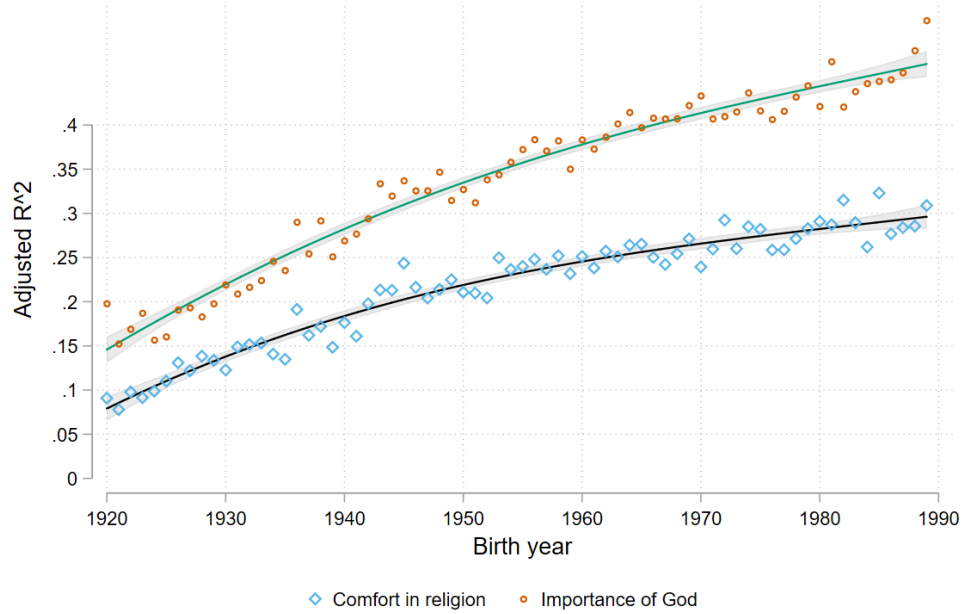
(b) Belief, Religious, and Attendance
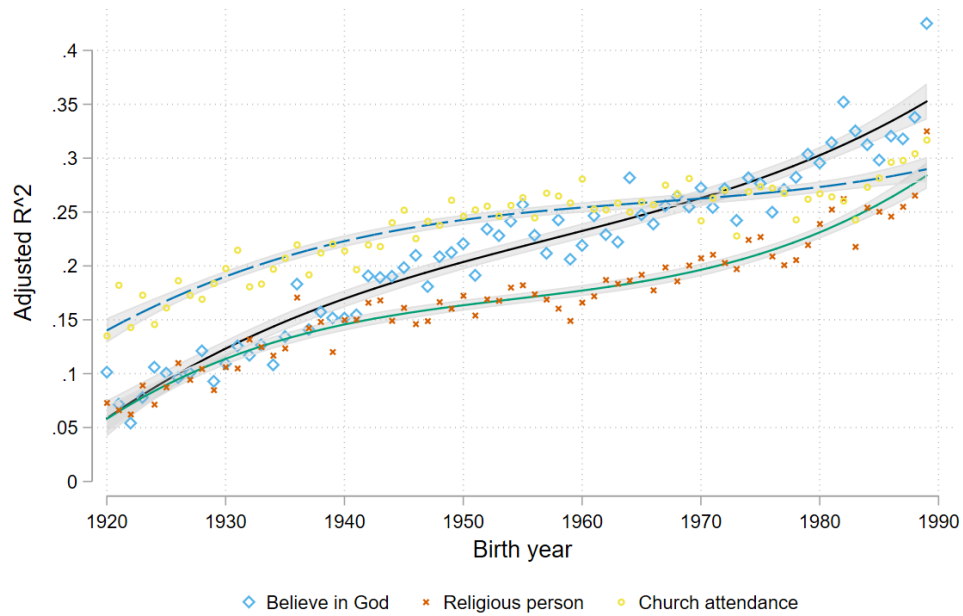
Note: R^2 of regressions of each religiosity measure for each birth year. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

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5.1 Between-Country versus Within-Country Dynamics

In the income inequality literature there is a general distinction between within-country inequality, between-country inequality, and world inequality (see for example Bourguignon & Morrisson (2002), Alvaredo *et al.* (2017) Milanovic (2011), and Milanovic (2016)). As we use individual level data we are able to analyze the development of all three kinds. In order to decompose world inequality in religiosity into contributions from between-country and within-country dynamics, we calculate the Theil index:

$$T = \sum_{i=1}^{N} p_i T_i + \sum_{i=1}^{N} (p_i \frac{y_i}{\mu}) ln(\frac{y_i}{\mu}) \tag{3}$$

where

$$T_i = \frac{1}{n} \sum_{s=1}^{n} \frac{y_s}{y_i} ln(\frac{y_s}{y_i}) \tag{4}$$

and N is the world population, p_i country i's share of the world population, T_i the Theil index of country i, y_i is the mean religiosity level of country i, and μ is the mean religiosity level in the world. In equation 4 the country-specific Theil index is calculated, and we have n as the total population of country i and y_s as the religiosity level of individual s. The first part of the right hand side is the within-country component equal to the population weighted within-country cultural inequality. The second term is the between-country inequality, where each individual in one country is assigned the country mean level of religiosity.

Table 2 shows the decomposition of the world inequality in religiosity. Over time, within-country inequality has dropped by 0.011, and between-country inequality increased by the same amount. There is consequently no change in total global inequality over the decades. This mirrors the developments in income inequality, reported by Bourguignon & Morrisson (2002). In almost the same period of time, they find that while total income inequality increased, within-country income inequality decreased and between-country income inequality more than doubled.

Table 2: Theil index of within and between country inequality in religiosity over time

Birth decade	Total	Between	Within	N
1920	0.059	0.011	0.048	28291
1930	0.058	0.015	0.043	48282
1940	0.057	0.018	0.040	65872
1950	0.058	0.016	0.041	89683
1960	0.058	0.016	0.041	96655
1970	0.059	0.017	0.042	82272
1980	0.059	0.022	0.037	44859

Theil index based on individual responses to religious faith being an important child quality or not. Weighted by country population.

Despite increasing between-country inequality in religiosity over the period of analysis, within-country inequality is consistently the largest component of total inequality as can be seen from Table 2. In the 1920s it represented 81 percent of the total inequality whereas in the 1980s it contributed with 63 percent. In section 5.3 we examine the inequality across other determinants than country in order to assess the underlying drivers of these developments.

5.2 Developments within World Regions

One possible explanation for the increasing cross-country inequality in religiosity may be that the world is increasingly being split into regions that converge towards different levels of religiosity. In order to test whether this is the underlying development of Figure 3 we compose seven cultural regions following Falk *et al.* (2018). The regions are Western Europe (WE), Eastern Europe and Central Asia (EECA), Neo-Europe (NE), South East Asia (SEA), Middle East and North Africa (MENA), Sub-Saharan Africa (SSA), and South America (SA).[9] As can be seen in Figure 7, country fixed effects explain a larger, and faster growing, share of the global variation in religiosity than region fixed effects. The regions of the world are thus becoming more different, but regional differences cannot compete with the variation explained by individual countries.

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[9]See Appendix Table A.1 for which countries are members of which regions.

Figure 7: R^2 of country or region fixed effects in explaining religious faith, across birth years
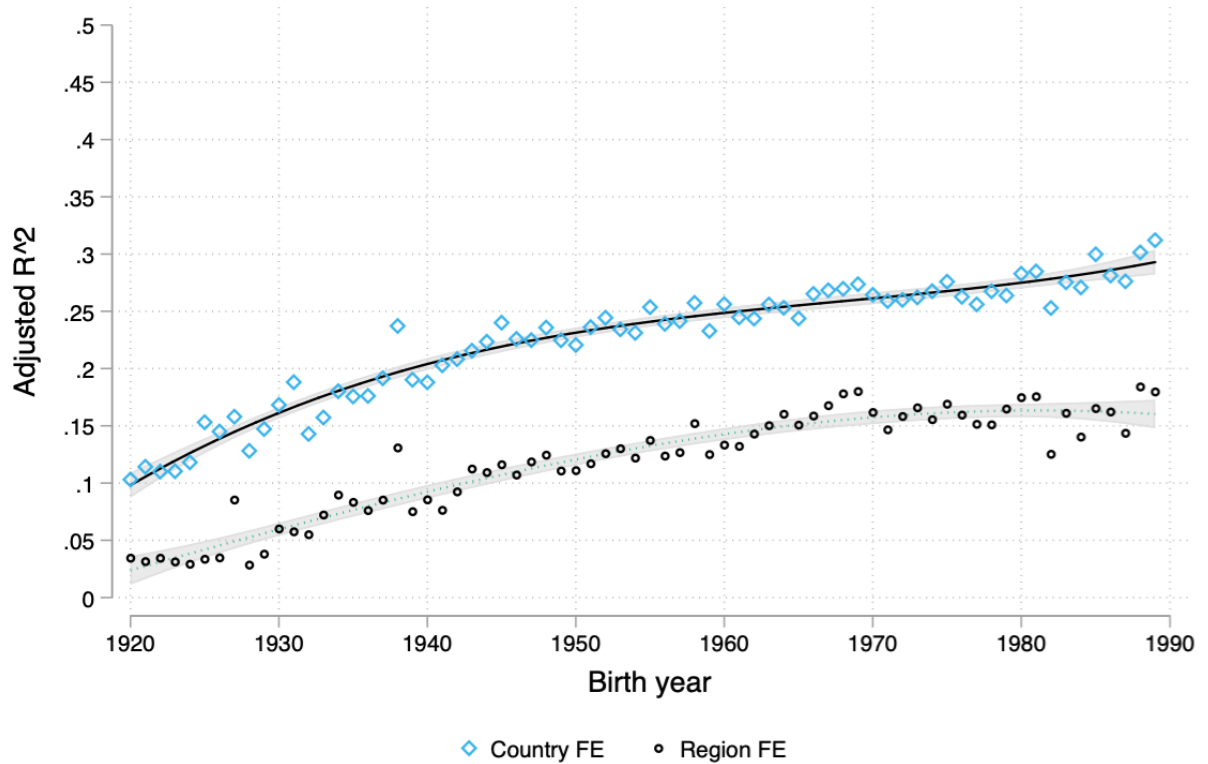
Note: Each dot represents the R^2 of one regression. The 95 %-confidence bands are calculated using local polynomial smooth.

The relatively higher share of the global variation in religiosity being explained by country fixed effects, compared to region fixed effects indicates that developments within regions are not homogeneous across included countries. Appendix Figure A.8 actually shows that the increase in between-country global inequality in religiosity must be driven by South East Asia. The strong growth in inequality in religiosity in SEA follows the pattern of income inequality in this region (Milanovic, 2011), indicating that this region in many ways is highly diverse. This is also evident from Figure 8 where religiosity at the country level across the globe is depicted. The religiosity level of China is low, whereas the religiosity levels of the Philippines and Indonesia are high and increasing over the period. The religiosity level of SSA and MENA have almost remained stable, and high, over the period, where the level of religiosity in Europe, Central Asia and Neo-Europe has decreased.

Figure 8: Global distribution of weighted country means of religiosity

(a) 1920s
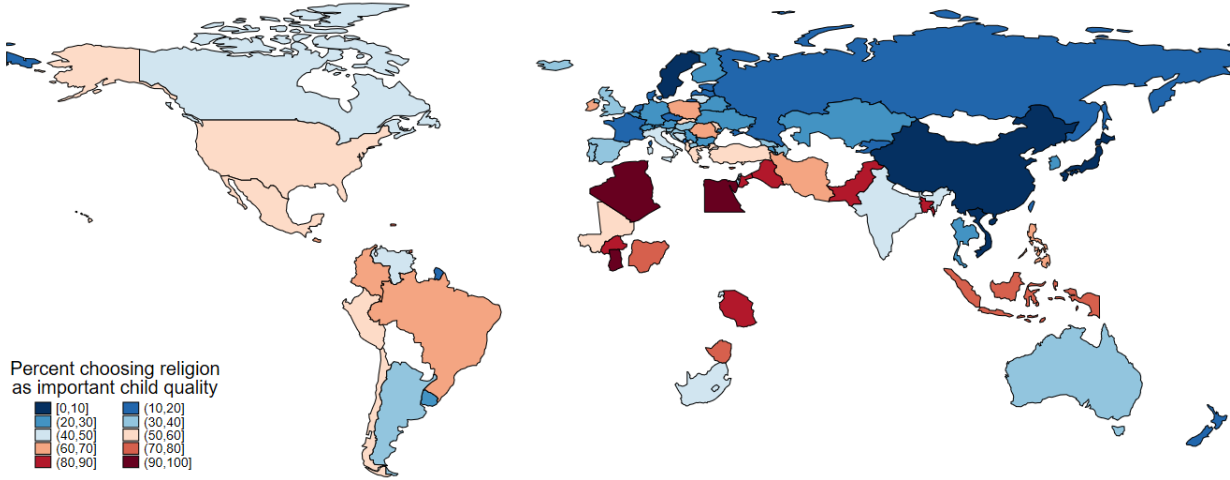
(b) 1980s
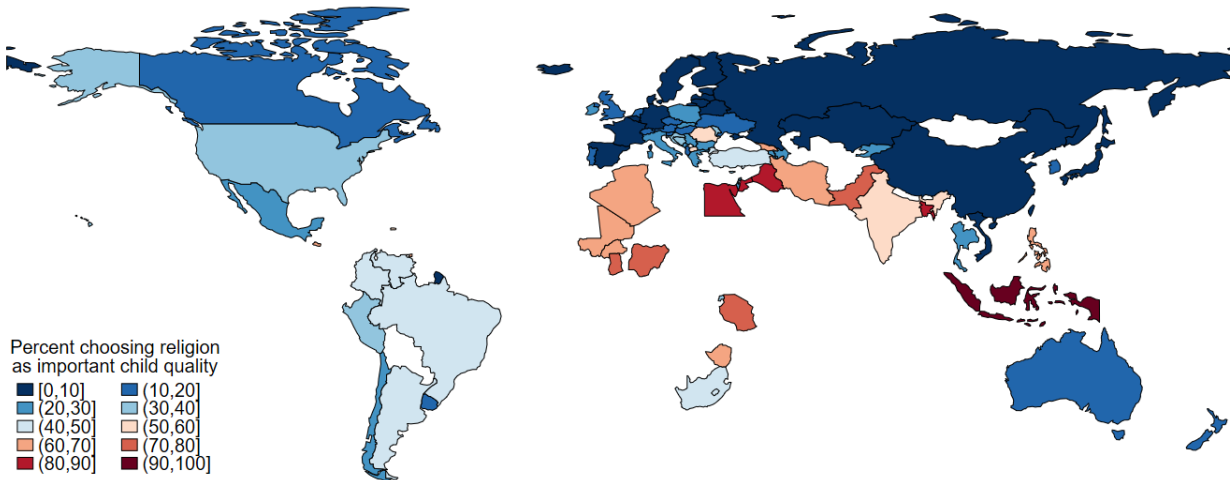
Note: Weighted country percentage choosing religious faith as an important child quality

More formally do we find increased Gini-coefficients in SEA, and decreased Gini-coefficients in Europe, Central Asia and Sub-Saharan Africa. The rest of the regions are associated with almost stable Gini-coefficients over the period. It is important to note that the Gini-coefficients are not calculated at the country level, but at the regional level giving more weight to more populous countries within each region.

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Figure 9: Regional, population-weighted Gini-coefficients in religiosity

(a) Western Europe, EECA, and SEA
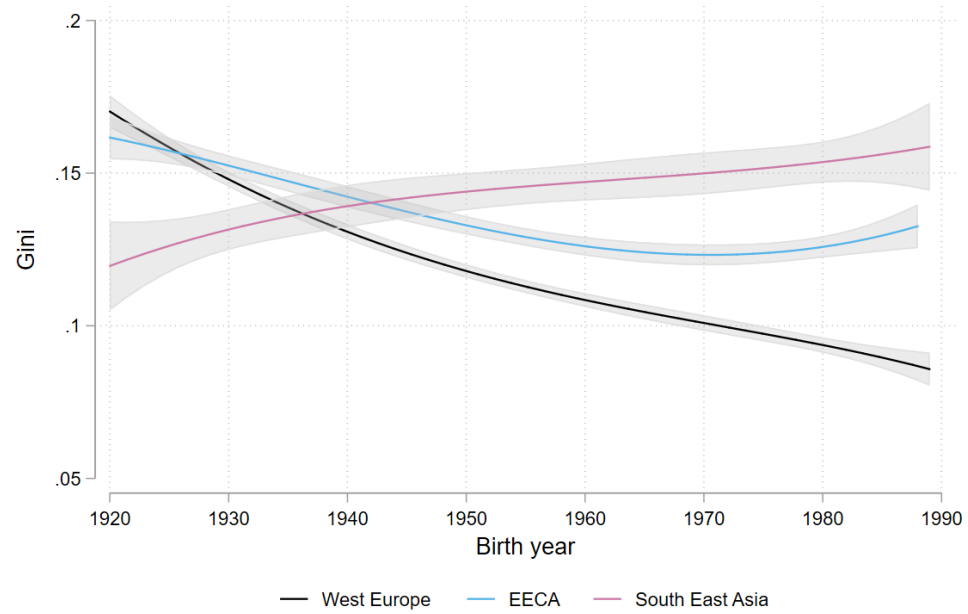
(b) SSA, MENA, Neo Europe, and South America
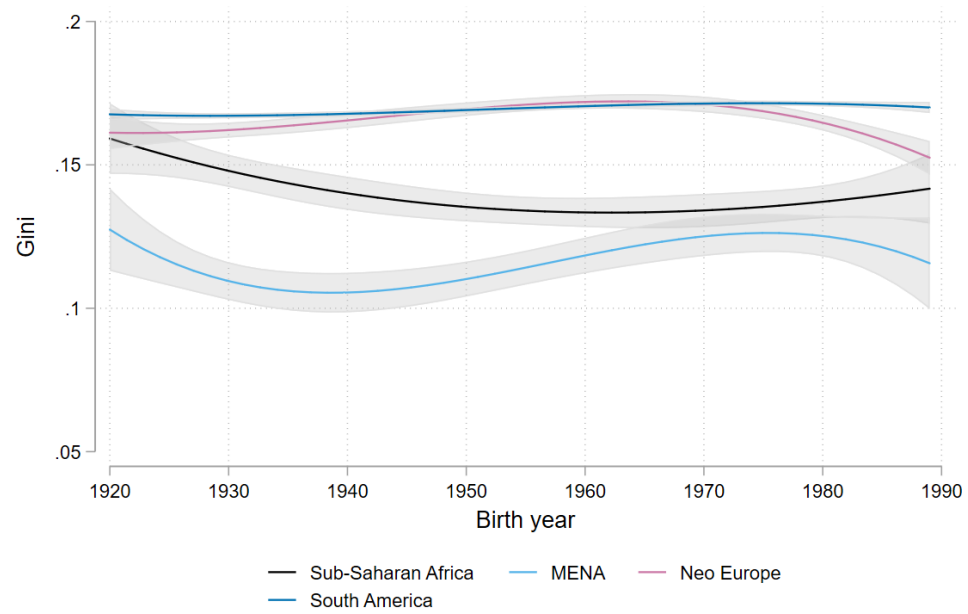
The 95 %-confidence bands are calculated using local polynomial smooth.

The falling inequality in religiosity in Europe and Central Asia can be seen as a natural consequence of low and falling levels of religiosity in these regions (see Appendix Figure A.9). Conversely, the SEA region moved from a very low level of religiosity to a high level, increasing the fraction indicating importance of religion.

5.3 Heterogeneity across Socioeconomic Groups

The analysis so far has shown that the development in religiosity has been highly different across countries and regions of the world. In this section we proceed to analyze the development across socioeconomic groups. We investigate socioeconomic drivers in terms of the size of town in which the respondent lives along with the level of income and education of the respondent. We create dummies for living in a major city (above 500,000 people), having an income in the top five income groups out of 11, and having an educational level above secondary school.

Table 3 shows the Theil indices in religiosity across each socioeconomic division over time. The results reveal that global inequality in religiosity is the same across groups, with the exception of lower inequality among those that live in major cities. In addition, between-country inequality has increased in all groups, and within-country inequality decreased. There are however differences in the contributions from between- and within-country inequality. For example, for the population living in major cities (panel a), between-country inequality dominated relative to within-country inequality in the 1980s. Besides being more alike in global terms, people living in major cities appear to have more equal levels within the same country than across countries. This is the contrary for the rest of the groups where within country inequality continues to dominate, despite the decrease. Consistent with the results of persistence in cultural values, we do find that inequality in religiosity has developed over time, though in a less rapid manner than income, where Bourguignon & Morrisson (2002) find between-country inequality to dominate already from the 1950s.

Table 3: Theil indices of inequality in religiosity over time and socioeconomic characteristic

	Panel a							
	City size above 500,000				City size below 500,000			
Birth decade	Total	Between	Within	N	Total	Between	Within	N
1920	0.052	0.013	0.039	3232	0.060	0.012	0.047	17160
1930	0.052	0.019	0.033	5733	0.060	0.015	0.045	29678
1940	0.053	0.023	0.030	7991	0.059	0.017	0.042	38929
1950	0.053	0.021	0.033	11080	0.059	0.016	0.043	51861
1960	0.053	0.020	0.033	12470	0.058	0.016	0.043	57577
1970	0.056	0.023	0.033	11020	0.059	0.016	0.043	47952
1980	0.054	0.030	0.024	6243	0.059	0.021	0.039	27166
	Panel b							
	Educational level above secondary				Educational level below university			
Birth decade	Total	Between	Within	N	Total	Between	Within	N
1920	0.060	0.006	0.053	10143	0.059	0.013	0.046	14693
1930	0.059	0.008	0.051	13931	0.059	0.017	0.043	29259
1940	0.059	0.010	0.048	20608	0.059	0.020	0.039	38391
1950	0.058	0.010	0.048	29502	0.058	0.018	0.040	51591
1960	0.058	0.012	0.046	30660	0.058	0.018	0.041	58603
1970	0.059	0.015	0.044	22602	0.059	0.019	0.040	55995
1980	0.059	0.020	0.039	11546	0.059	0.023	0.036	32118
	Panel c							
	Top five income groups				Bottom five income group			
Birth decade	Total	Between	Within	N	Total	Between	Within	N
1920	0.059	0.010	0.049	5144	0.059	0.013	0.045	16565
1930	0.058	0.014	0.044	10571	0.058	0.018	0.040	25595
1940	0.059	0.017	0.041	19194	0.057	0.019	0.038	30890
1950	0.058	0.017	0.041	27118	0.058	0.017	0.041	43296
1960	0.058	0.018	0.040	27455	0.058	0.016	0.042	48707
1970	0.059	0.019	0.039	22261	0.059	0.017	0.043	41529
1980	0.060	0.023	0.037	11559	0.060	0.021	0.038	19920

Theil index based on individual responses to religious faith being an important child quality or not. Weighted by country population.

5.4 Heterogeneity across Religious Denominations

The evidence so far has indicated that the increased global inequality in religiosity has not been driven by a particular socio-economic group. In this section we examine the impact from changes in the denominational distribution across the world over the period of analysis. In our baseline sample of 90 countries represented in all periods, the share of people adhering to Islam increased from 5 percent among those born in the 1920s to 21 percent among those born in the 1980s, see Figure 10. Over the same period, the share of Christians decreased from 61 percent to 26 percent, and Hindus increased from 12 to 14 percent. The share of people belonging to other religions have stayed constant at around seven percent, whereas the group with no religious affiliation has increased from 15 to 32 percent. These developments are supported by a recent from the Pew Research Center (Pew, 2017).

Figure 10: Development in the population weighted percentage adhering to the main denominations
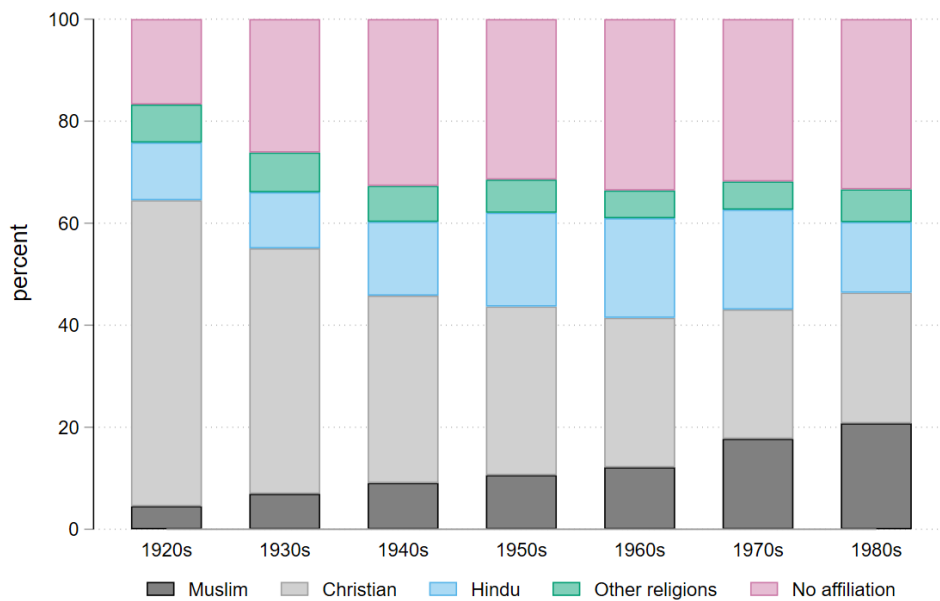
Weighted percentage of the population born in the respective decade adhering to the religious denomination

The large changes in the sizes of denominations may be one source behind the increase in between-country inequality. In a last exercise we therefore looked at the inequality in religiosity

across and within denominations. As can be seen from Figure 11, the religiosity level of the different denominations has generally been stable over the period. The mean religiosity level of Muslims decreased from the 1920s with around 70 percent stating that religious faith is an important child quality in the 1920s to the 1980s where around 66 percent state the same. The level of religiosity of Christians basically stayed constant at around 40 percent throughout the period, whereas the Hindus increased their level dramatically at the end of the period.

Figure 11: Development in the population weighted average religiosity level across denominations
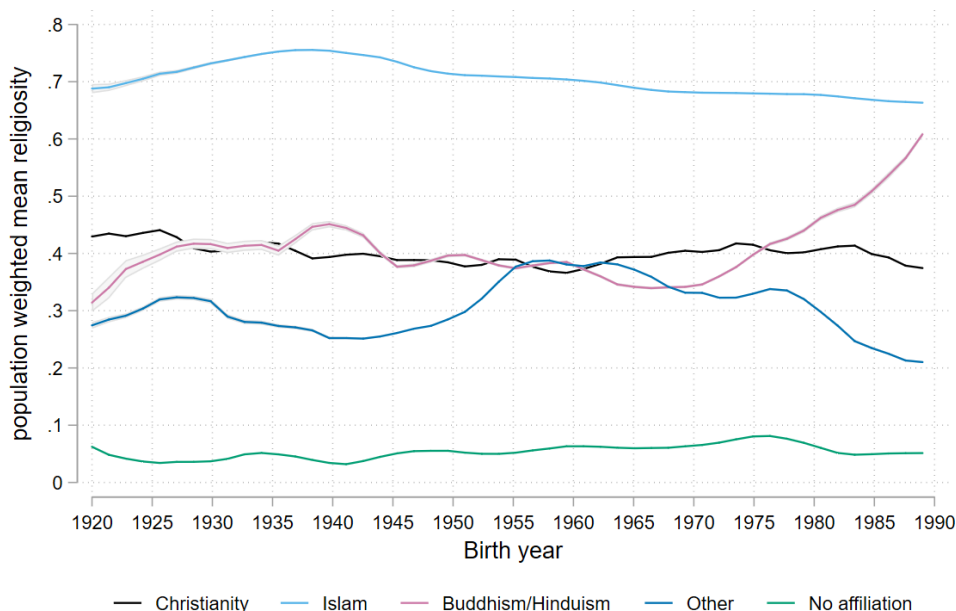
The 95 %-confidence bands are calculated using local polynomial smooth.

If each denomination had the same size all over the period this picture of relative stability in levels would lead to constant levels of equality in religiosity across the globe. The increasing number of both Muslims and those with no religious affiliation can explain the increasing between-country inequality as they do not populate the same countries. To see whether the effect is also driven by increasing inequalities within denominations we again computed the Theil index of inequality within and between countries for each denominational group. Inequality in religiosity for Muslims has changed over the period, see Table 4 Panel (a). The level of inequality has been lower for Muslims throughout the period, but especially in the 1930s and 1940s the

inequality dropped to about half of the inequality within the Christians and Hindus. The overall level of inequality has been constant for Christians, though with increasing between country inequality as seen globally. The contribution from between-country inequality has been low throughout the period for all the three major religions. Table 4 Panel (b) shows the development for Hindus and other religions, depicting two very opposite groups. As the Hindus mainly live in India we find no between-country inequality, whereas the people adhering to the smaller religions are spread all over the world and thereby have the highest between country inequality.

Table 4: Theil index of within and between country inequality in religiosity over time and denomination

	Panel a							
	Christians				Muslims			
Birth decade	Total	Between	Within	N	Total	Between	Within	N
1920	0.059	0.006	0.053	20435	0.041	0.003	0.038	903
1930	0.060	0.007	0.053	31931	0.032	0.004	0.028	2732
1940	0.060	0.009	0.051	38743	0.033	0.004	0.029	5273
1950	0.060	0.008	0.051	48115	0.038	0.006	0.032	9524
1960	0.060	0.009	0.051	49277	0.041	0.005	0.036	13505
1970	0.060	0.009	0.050	38174	0.040	0.004	0.037	16161
1980	0.060	0.010	0.049	18694	0.040	0.004	0.036	9853
	Panel b							
	Hindus				Other religion			
Birth decade	Total	Between	Within	N	Total	Between	Within	N
1920	0.060	0.001	0.059	331	0.058	0.010	0.048	1205
1930	0.059	0.000	0.059	579	0.056	0.015	0.041	2519
1940	0.060	0.000	0.059	2097	0.055	0.014	0.041	3467
1950	0.060	0.000	0.059	2097	0.059	0.017	0.042	4855
1960	0.059	0.000	0.059	2624	0.060	0.018	0.042	4491
1970	0.060	0.000	0.059	2033	0.059	0.016	0.043	3596
1980	0.052	0.000	0.052	713	0.053	0.021	0.033	2106

Theil index based on individual responses to religious faith being an important child quality or not. Weighted by country population.

6 Conclusion

Our aim in this paper is to investigate if people across the globalized world become more or less alike in terms of cultural traits. We employ the largest survey of global values, the combined EVS and WVS, and look at which qualities respondents want to instill in children. To study cultural values over time, we exploit that respondents were born in different years and assume that their cultural values are influenced by the cultural environment around birth.

Our results show evidence of diminishing global differences in terms of an economic value such as hard work. While an emphasis on independence is generally on the rise throughout the period, people of the world remain equally similar on this cultural dimension. This result speaks to the existence of strong cultural persistence, where national cultural values are not converging towards the modern western. The value of hard work is on the other hand less persistent and we observe an increasing equality across countries in the distribution of this value. At the other end of the scale does our results show that people across countries are becoming more diverse in terms of more traditional values, such as an emphasis on religious faith and obedience.

The increased cross-country inequality in religiosity is supported by other measures of religiosity confirming the development. We find a constant global inequality in religiosity meaning that the with-in country inequality in religiosity has declined. This trend mirrors the development in income inequality as found by Bourguignon & Morrisson (2002) among others. Our results indicate that the driving force behind the increased cross-country inequality in religiosity is the stable high levels in MENA and increasing levels in the Philippines, Indonesia and India. On the contrary have religiosity levels in Europe, Central Asia and Neo-Europe decreased. We find that the religiosity levels of most denominations have stayed relatively constant, except an increase for Hindus. The most religious denomination in the world is Islam with around 70 percent choosing religious faith as an important child quality throughout the period of analysis. At the other end of the scale are the none-religious. As both of these two groups are growing this has contributed to the explanation of the increased cross-country inequality in religiosity.

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A Appendix: Additional Tables and Figures

Table A.1: Countries included with at least 10 observations in each birth year decade

				Decade					
Country/region	1	2	3	4	5	6	7	Total	Region
Albania	76	269	467	727	826	668	446	3,479	EECA
Algeria	20	71	222	286	499	706	431	2,235	MENA
Andorra	12	48	118	185	260	263	117	1,003	WE
Argentina	769	746	1,002	1,133	1,134	1,015	453	6,252	SA
Armenia	202	501	472	817	934	1,055	482	4,463	EECA
Australia	827	707	1,169	1,368	1,095	687	240	6,093	NE
Austria	654	616	770	802	832	508	280	4,462	WE
Azerbaijan	68	171	293	665	753	750	201	2,901	EECA
Bangladesh	34	120	240	522	979	1,019	106	3,020	SEA
Belarus	552	821	1,011	1,391	1,451	1,096	671	6,993	EECA
Belgium	1,394	1,008	1,190	1,390	1,441	650	242	7,315	WE
Bosnia	104	307	495	685	687	778	439	3,495	EECA
Brazil	41	530	553	880	1,281	635	622	4,542	SA
Bulgaria	643	858	1,022	1,063	959	760	291	5,596	EECA
Burkina Faso	12	31	89	132	283	430	437	1,414	SSA
Canada	1,074	834	1,202	1,599	1,339	698	311	7,057	NE
Chile	381	551	779	1,108	1,405	983	397	5,604	SA
China	187	504	1,228	1,686	2,066	1,302	668	7,641	SEA
Colombia	64	588	1,137	1,951	2,766	2,859	955	10,320	SA
Croatia	207	430	539	714	699	732	338	3,659	EECA
Cyprus	102	274	414	518	494	504	636	2,942	WE
Czech Rep.	1,089	1,222	1,469	1,524	1,344	892	289	7,829	EECA
Denmark	785	561	879	1,019	891	428	174	4,737	WE
Egypt	114	388	704	1,221	1,719	1,898	1,317	7,361	MENA
El Salvador	56	120	147	198	281	402	50	1,254	SA
Estonia	493	866	996	1,161	1,089	896	458	5,959	EECA
Finland	351	484	834	1,014	944	799	284	4,710	WE
France	926	838	959	1,339	1,144	771	330	6,307	WE
Georgia	267	694	754	1,078	1,169	1,314	685	5,961	EECA
Germany	2,092	2,201	2,343	2,899	3,032	1,473	741	14,781	WE
Ghana	13	42	147	229	386	640	1,131	2,588	SSA

Great Britain	1,684	1,205	1,502	1,721	1,709	1,040	456	9,317	WE
Greece	132	280	348	445	512	696	164	2,577	WE
Hong Kong	40	209	212	437	503	405	278	2,084	SEA
Hungary	571	581	798	989	888	819	451	5,097	EECA
Iceland	392	328	544	797	756	416	144	3,377	WE
India	419	577	1,189	2,203	2,680	2,124	709	9,901	SEA
Indonesia	27	107	449	667	473	619	646	2,988	SEA
Iran	70	233	304	548	938	1,660	1,427	5,180	MENA
Iraq	90	155	407	858	1,428	1,811	1,284	6,033	MENA
Ireland	781	514	675	916	720	398	163	4,167	WE
Israel	101	95	143	219	192	348	93	1,191	MENA
Italy	1,031	1,173	1,245	1,490	1,649	926	350	7,864	WE
Japan	737	1,309	1,747	1,754	1,229	987	347	8,110	SEA
Jordan	45	141	274	433	804	999	694	3,390	MENA
Kazakhstan	12	58	111	188	282	341	362	1,354	EECA
Kosovo	10	56	144	244	259	316	547	1,576	EECA
Kyrgyzstan	40	94	160	336	590	585	561	2,366	EECA
Latvia	399	659	798	917	882	663	268	4,586	EECA
Lithuania	453	652	656	833	928	686	281	4,489	EECA
Luxembourg	135	209	323	458	490	561	640	2,816	WE
Macedonia	112	317	496	735	782	751	347	3,540	EECA
Mali	19	44	112	194	273	400	338	1,380	SSA
Malta	421	499	661	674	457	435	158	3,305	MENA
Mexico	425	832	1,317	2,093	2,813	2,039	966	10,485	SA
Moldova	271	459	591	948	905	749	638	4,561	EECA
Montenegro	86	337	385	519	530	593	344	2,794	EECA
Netherlands	899	943	1,565	1,538	1,479	792	380	7,596	WE
New Zealand	283	373	524	611	583	397	136	2,907	NE
Nigeria	94	127	492	1,101	1,829	1,878	907	6,428	SSA
Norway	829	641	1,049	1,076	1,068	549	297	5,509	WE
Pakistan	29	167	345	567	985	1,302	304	3,699	MENA
Peru	61	236	546	886	1,196	1,419	879	5,223	SA
Philippines	108	200	393	656	882	930	317	3,486	SEA
Poland	863	1,053	1,163	1,663	1,188	972	594	7,496	EECA
Portugal	594	623	567	566	734	477	158	3,719	WE
Puerto Rico	250	347	131	446	522	127	36	1,859	SA
Romania	662	1,127	1,287	1,621	1,523	1,303	630	8,153	EECA

Russia	1,227	1,635	1,629	2,670	2,266	1,698	1,158	12,283	EECA
Rwanda	21	59	100	245	418	909	1,047	2,799	SSA
Serbia	310	661	827	1,004	994	968	428	5,192	EECA
Singapore	37	148	295	539	661	686	805	3,171	SEA
Slovakia	646	754	967	1,264	1,071	670	145	5,517	EECA
Slovenia	570	841	1,015	1,301	1,184	1,048	488	6,447	EECA
South Africa	798	1,485	1,977	3,063	3,484	3,075	2,065	15,947	SSA
South Korea	137	413	985	1,381	1,615	1,118	387	6,036	SEA
Spain	2,404	1,958	2,031	2,471	2,579	1,742	653	13,838	WE
Sweden	854	923	1,490	1,338	1,259	893	419	7,176	WE
Switzerland	772	642	933	1,026	1,013	522	198	5,106	WE
Taiwan	131	265	395	799	650	481	390	3,111	SEA
Tanzania	15	66	125	243	274	347	76	1,146	SSA
Thailand	50	144	264	549	748	572	331	2,658	SEA
Trinidad and Tobago	64	147	297	305	342	395	379	1,929	SA
Turkey	260	750	1,199	2,221	2,968	3,448	1,712	12,558	MENA
Ukraine	682	1,079	1,172	1,642	1,401	1,207	709	7,892	EECA
United States	1,795	1,120	1,733	2,329	1,862	946	447	10,232	NE
Uruguay	253	385	448	469	478	528	335	2,896	SA
Venezuela	75	174	280	458	599	730	84	2,400	SA
Viet Nam	90	206	273	466	570	522	366	2,493	SEA
Zimbabwe	29	66	140	249	376	643	721	2,224	SSA
Total	38,004	48,282	65,872	89,683	96,655	82,272	44,859	465,627	

Table A.2: Summary statistics of additional varaibles

	Full sample			Restricted sample		
	Observations (millions)	Mean	Std. Dev.	Observations (millions)	Mean	Std. Dev.
Thrift	28,472	0.44	0.50	26,597	0.437	0.496
Work	28,511	0.62	0.49	26,634	0.621	0.485
Obedience	28,462	0.36	0.48	26,587	0.356	0.479
Determination	28,330	0.36	0.48	26,458	0.355	0.478
Unselfishness	28,352	0.31	0.46	26,480	0.306	0.461
Responsibility	28,523	0.65	0.48	26,646	0.655	0.475
Tolerance	28,489	0.63	0.48	26,613	0.635	0.481
Imagination	28,349	0.23	0.42	26,478	0.231	0.422
Importance of family	26,739	0.84	0.37	25,196	0.841	0.365
Importance of friends	26,554	0.39	0.49	25,014	0.390	0.488
Importance of leisure	26,322	0.27	0.44	24,790	0.262	0.440
Importance of politics	25,818	0.16	0.36	24,298	0.156	0.363
Importance of work	26,429	0.63	0.48	24,906	0.630	0.483
Importance of religion	25,800	0.37	0.48	24,272	0.360	0.480
Trust	27,235	0.37	0.48	25,432	0.371	0.483

Table A.3: Countries included with at least 10 observations in each age decade

Country	1	2	3	4	5	6	7	Total
Argentina	492	1,487	1,312	1,018	878	790	297	6,274
Australia	244	1,043	1,096	1,030	1,024	877	426	5,740
Austria	226	734	828	872	733	726	255	4,374
Armenia	305	1,024	829	835	606	462	244	4,305
Belgium	435	1,426	1,309	1,319	1,106	1,043	464	7,102
Bosnia	195	900	744	659	542	322	119	3,481
Brazil	243	1,369	1,064	830	838	276	98	4,718
Bulgaria	245	887	977	1,026	933	910	431	5,409
Belarus	442	1,563	1,459	1,319	1,055	852	351	7,041
Canada	430	1,317	1,446	1,293	1,032	817	444	6,779
Chile	453	1,395	1,238	1,013	770	556	196	5,621
Taiwan	148	618	720	658	556	319	147	3,166
Croatia	262	850	667	715	552	388	190	3,624
Cyprus	161	730	477	542	474	373	201	2,958
Czech Rep.	387	1,344	1,441	1,446	1,335	1,194	579	7,726
Denmark	262	944	883	838	735	595	296	4,553
Estonia	356	1,099	1,064	1,090	955	855	461	5,880
Finland	224	885	1,009	958	717	613	256	4,662
France	338	1,289	1,264	1,024	949	787	396	6,047
Georgia	367	1,230	1,259	1,134	961	671	370	5,992
Germany	728	2,590	2,619	2,744	2,367	2,319	1,093	14,460
Greece	155	634	488	450	348	266	181	2,522
Hong Kong	124	360	444	507	379	285	81	2,180
Hungary	276	943	982	916	888	682	298	4,985
Iceland	255	860	708	625	441	326	144	3,359
India	550	2,988	2,851	1,847	1,021	626	154	10,037
Iran	758	1,860	1,076	675	372	235	57	5,033
Iraq	514	1,837	1,714	1,113	629	273	102	6,182
Ireland	267	947	770	688	627	457	269	4,025
Israel	93	348	192	219	143	95	67	1,157
Italy	492	1,732	1,477	1,324	1,268	1,073	401	7,767
Japan	314	1,365	1,493	1,629	1,445	1,307	538	8,091
Kazakhstan	104	404	341	282	188	111	51	1,481
Jordan	387	976	944	618	357	229	82	3,593
Kyrgyzstan	259	705	573	489	292	138	66	2,522
Latvia	299	881	931	845	714	579	290	4,539
Lithuania	339	832	868	811	659	649	262	4,420
Luxembourg	325	723	476	478	342	250	131	2,725
Malta	142	537	570	572	571	500	283	3,175
Mexico	1,302	3,432	2,376	1,639	1,134	471	179	10,533
Moldova	324	916	843	972	699	464	261	4,479
Montenegro	117	642	581	541	431	373	100	2,785
Netherlands	352	1,104	1,468	1,357	1,214	1,229	606	7,330
New Zealand	89	348	559	610	531	418	254	2,809
Peru	661	1,598	1,193	989	563	325	56	5,385
Philippines	309	918	876	700	411	254	99	3,567
Poland	384	1,301	1,393	1,429	1,409	974	472	7,362
Portugal	232	610	620	579	535	583	371	3,530
Puerto Rico	36	517	458	120	381	275	56	1,843
Romania	363	1,512	1,457	1,435	1,437	1,269	541	8,014
Russia	658	2,268	2,527	2,314	2,012	1,589	767	12,135
Rwanda	203	1,181	838	397	197	96	36	2,948
Serbia	208	1,038	1,004	1,011	927	647	307	5,142
Singapore	352	782	689	587	437	250	109	3,206
Slovakia	263	873	1,106	1,114	918	724	384	5,382
Viet Nam	177	531	592	524	307	223	107	2,461
Slovenia	312	1,175	1,207	1,210	1,153	844	389	6,290
South Africa	1,176	4,449	4,082	2,803	1,978	1,145	358	15,991
Spain	1,050	2,929	2,622	2,245	1,930	1,792	904	13,472
Sweden	424	1,257	1,291	1,387	1,263	1,140	471	7,233
Switzerland	135	760	1,011	1,003	797	716	448	4,870
Thailand	65	398	597	712	555	254	98	2,679
Trinidad and Tobago	133	422	377	333	301	263	107	1,936
Turkey	1,106	3,834	3,096	2,376	1,286	764	248	12,710
Ukraine	420	1,404	1,533	1,486	1,379	1,012	560	7,794
Macedonia	164	811	805	707	522	378	130	3,517
Egypt	470	1,930	1,887	1,447	925	594	169	7,422
Great Britain	550	1,720	1,700	1,505	1,360	1,203	733	8,771
United States	634	1,959	1,952	1,719	1,567	1,435	716	9,982
Uruguay	234	535	515	511	444	429	231	2,899
Venezuela	253	775	550	395	252	123	40	2,388
Total	25,752	87,585	82,408	72,608	59,057	46,082	21,078	394,570

Table A.4: The explanatory power of different fixed effects

	country	region	region*size of town	region*income	region*denomination	region*age	region*education	region*gender
				Independence				
N	416689	416689	245043	324048	315694	416689	335456	413253
Adj. R^2	0.101	0.0398	0.0444	0.0599	0.0409	0.0480	0.0547	0.0389
Df. model	81	11	59	75	46	66	59	18
				Determination				
N	410153	410153	240934	317721	309480	410153	329307	406717
Adj. R^2	0.0475	0.0197	0.0156	0.0287	0.0227	0.0246	0.0237	0.0196
Df. model	81	11	59	76	46	66	59	18
				Faith				
N	414888	414888	243928	322024	315020	414888	333654	411452
Adj. R^2	0.236	0.141	0.153	0.159	0.142	0.145	0.147	0.146
Df. model	81	11	59	76	46	63	59	18
				Obedience				
N	416628	416628	245030	324036	315717	416628	335397	413192
Adj. R^2	0.104	0.0479	0.0616	0.0590	0.0572	0.0499	0.0667	0.0485
Df. model	81	11	59	76	46	65	59	18
				Thrift				
N	416957	416957	245042	324046	315986	416957	335719	413521
Adj. R^2	0.0623	0.0327	0.0365	0.0437	0.0335	0.0418	0.0385	0.0313
Df. model	81	11	59	76	46	65	59	18
				Hard work				
N	415945	415945	245055	321786	314908	415945	335089	412509
Adj. R^2	0.234	0.148	0.161	0.155	0.148	0.152	0.136	0.148
Df. model	81	11	59	76	46	65	59	18

Figure A.1: Distribution of country means across birth decades

(a) Independence

(b) Faith

(c) Hard work
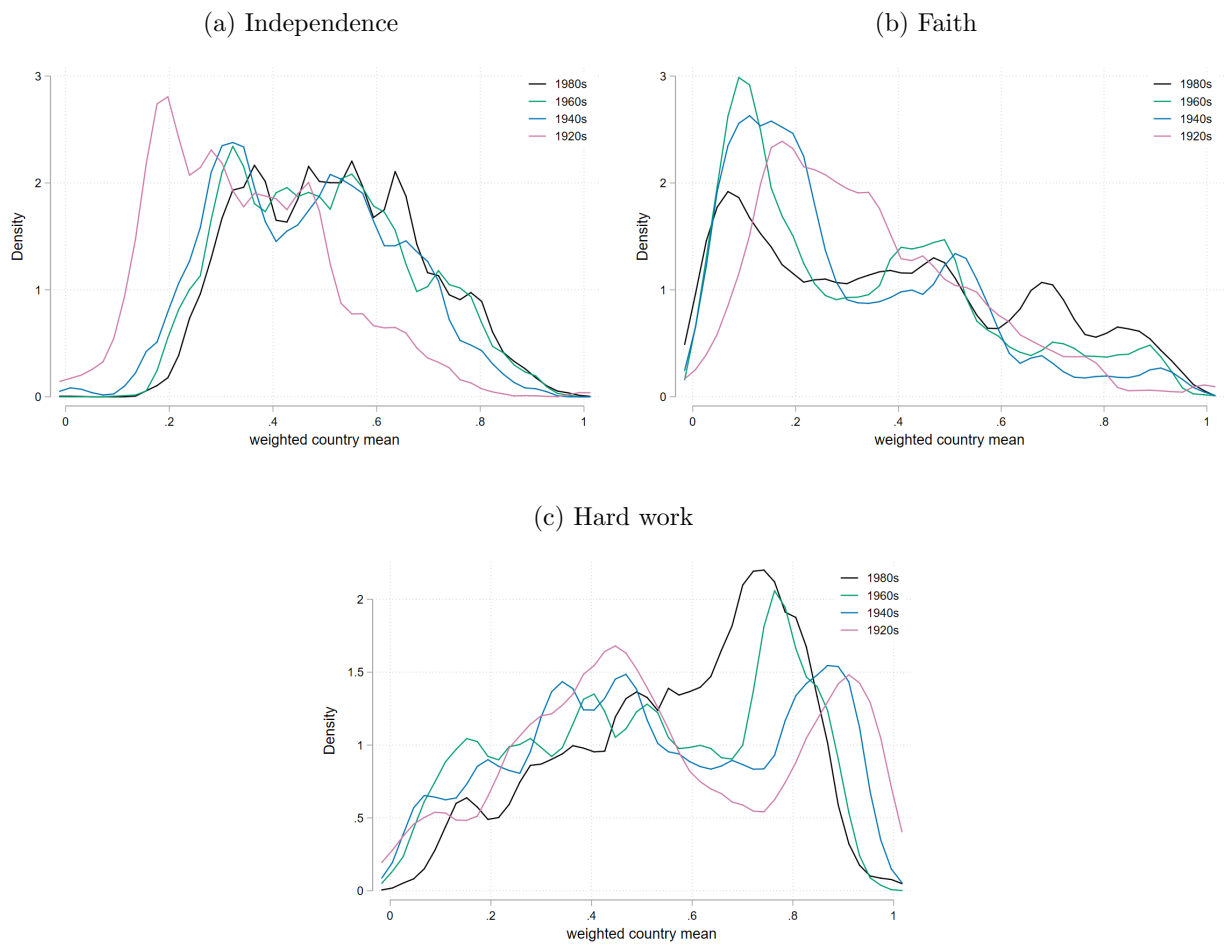
Figure A.2: R^2 of country fixed effects across birth years
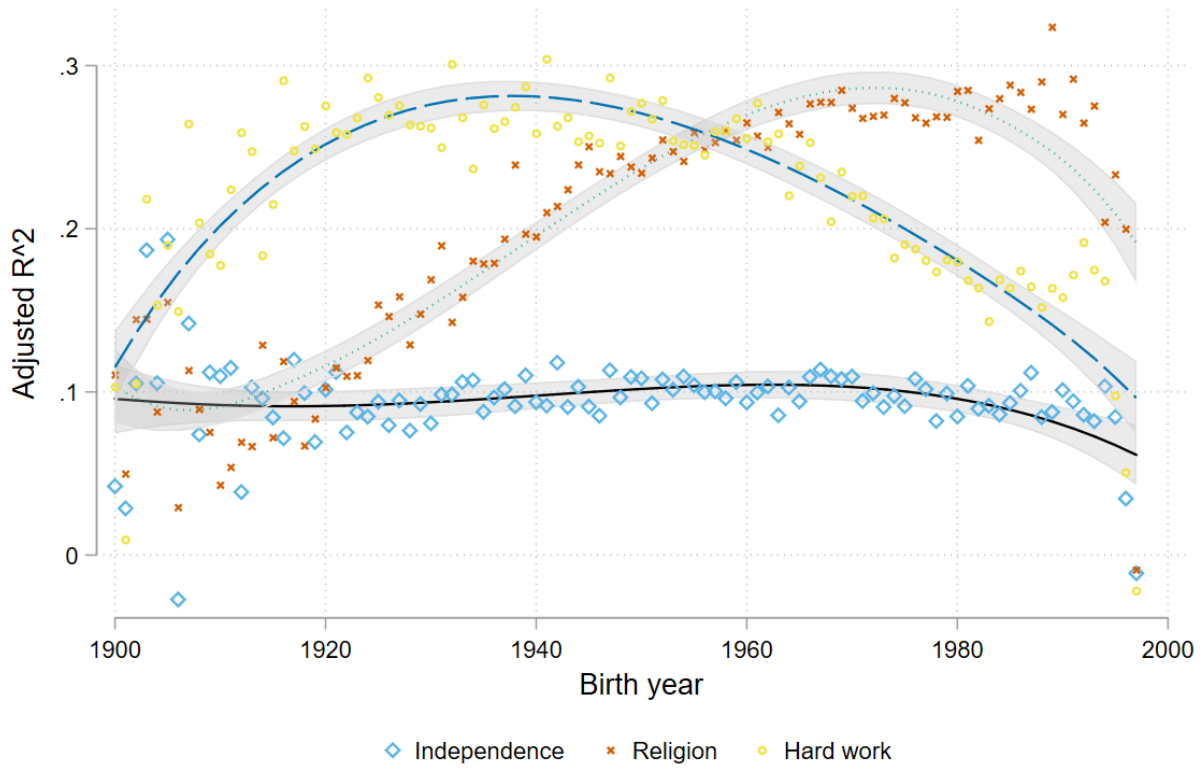
Note: R^2 of regressions of each dimension of culture for each birth year, on the extended sample. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

Figure A.3: R^2 of country fixed effects across birth years
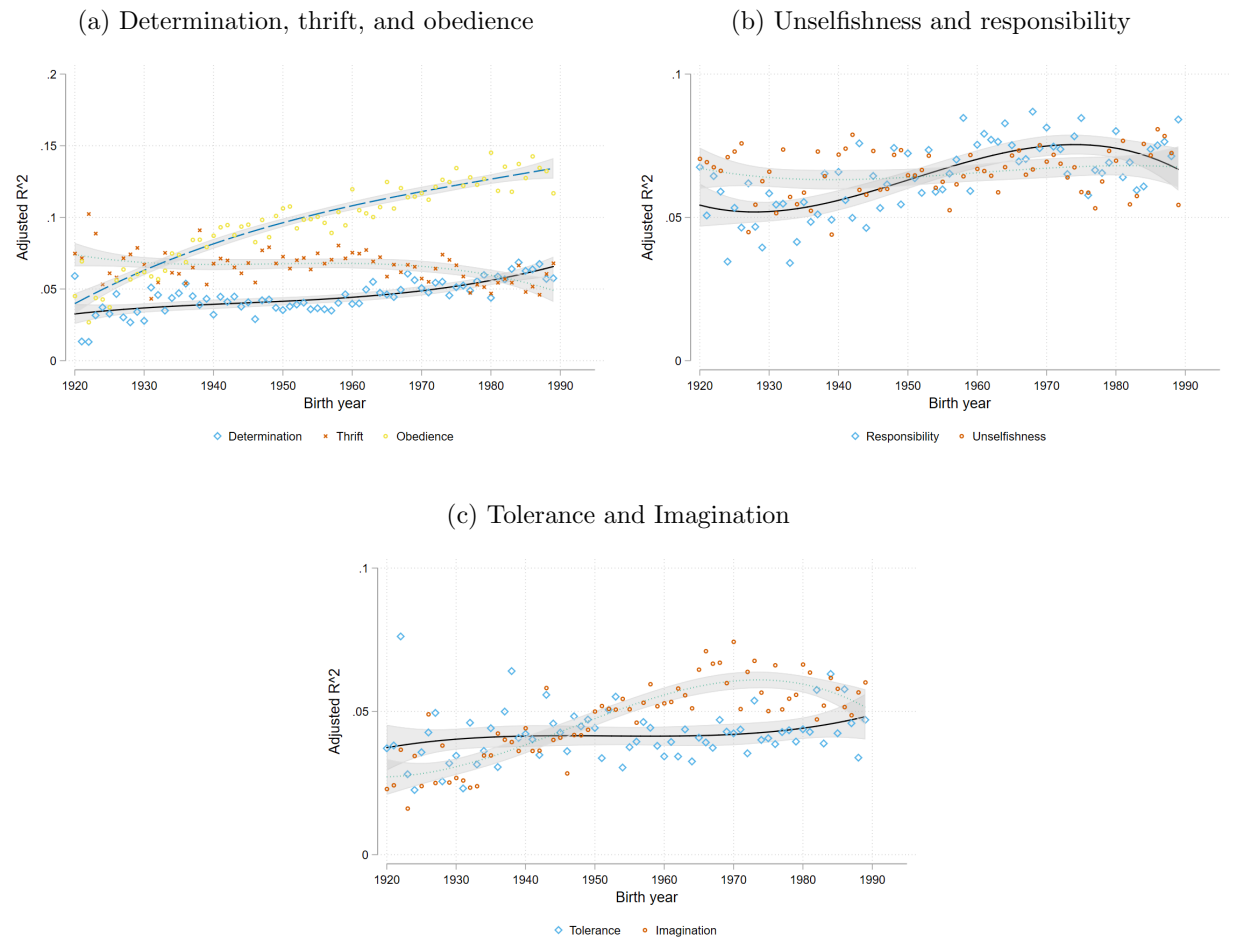
(a) Determination, thrift, and obedience

(b) Unselfishness and responsibility

(c) Tolerance and Imagination

Notes: R^2 of regressions of each dimension of culture for each birth year. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

Figure A.4: R^2 of country fixed effects across birth years: Random sample
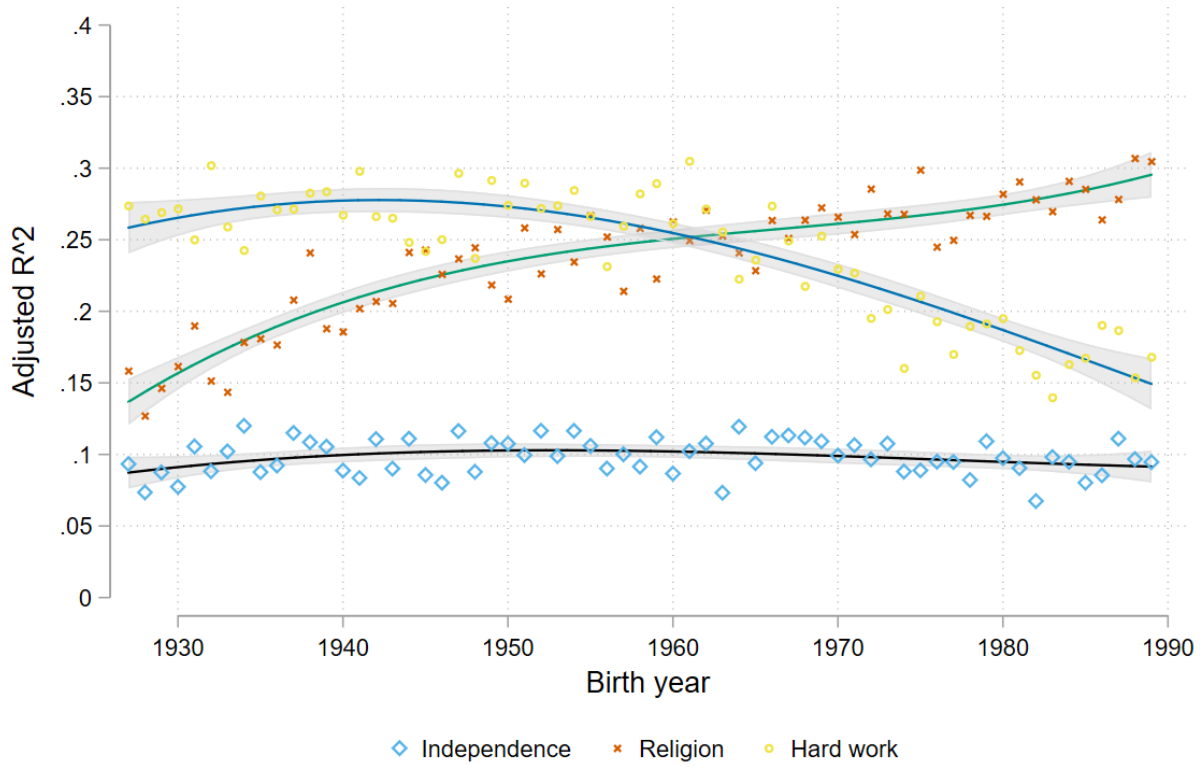
Figure A.5: R^2 of country fixed effects across birth years - trust and personal values

(a) Trust, Family, and friends
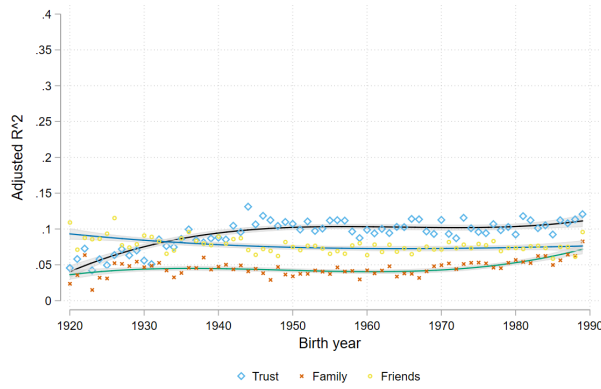
(b) Leisure, politics, work, and religion
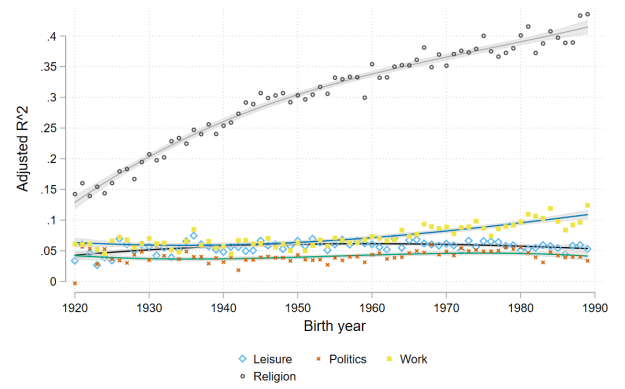
Notes: R^2 of regressions of each dimension of culture for each birth year. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

Figure A.6: R^2 of country fixed effects across age
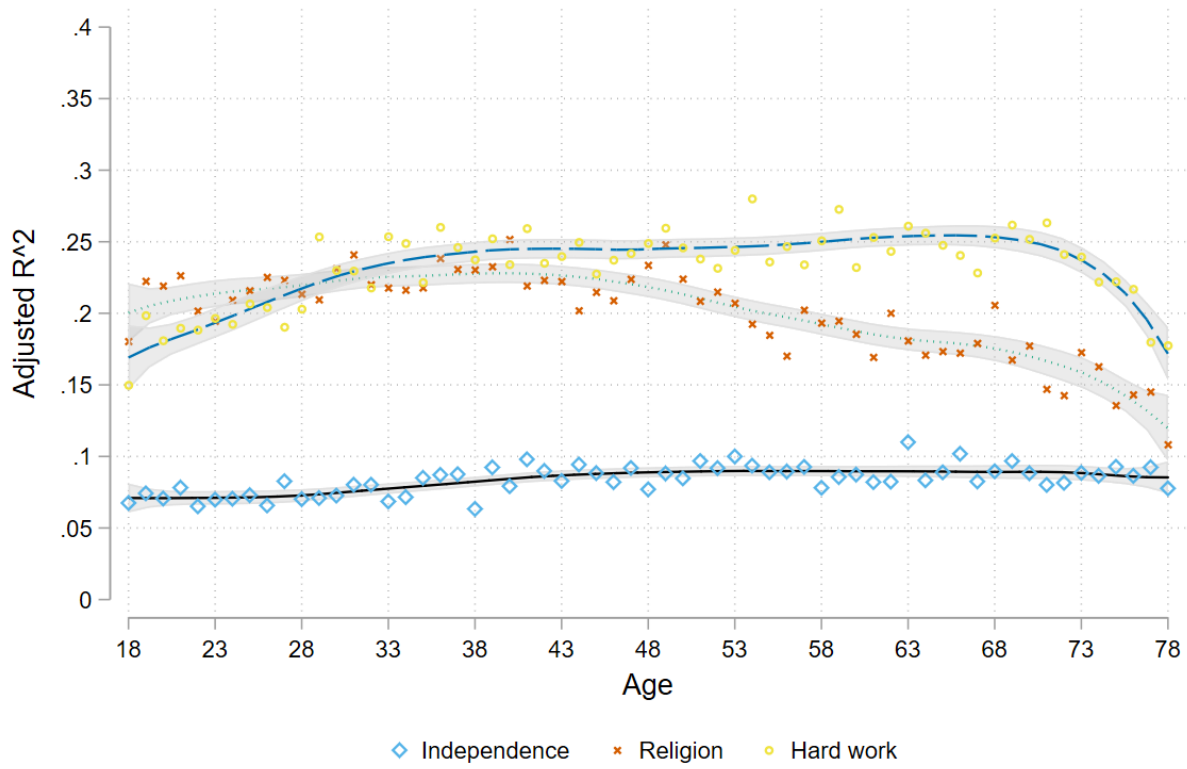
Notes: R^2 of regressions of each dimension of culture for each age year. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

Figure A.7: Change in within country inequality from 1920s to 1980s

(a) Religiosity

(b) Hard work

(c) Independence
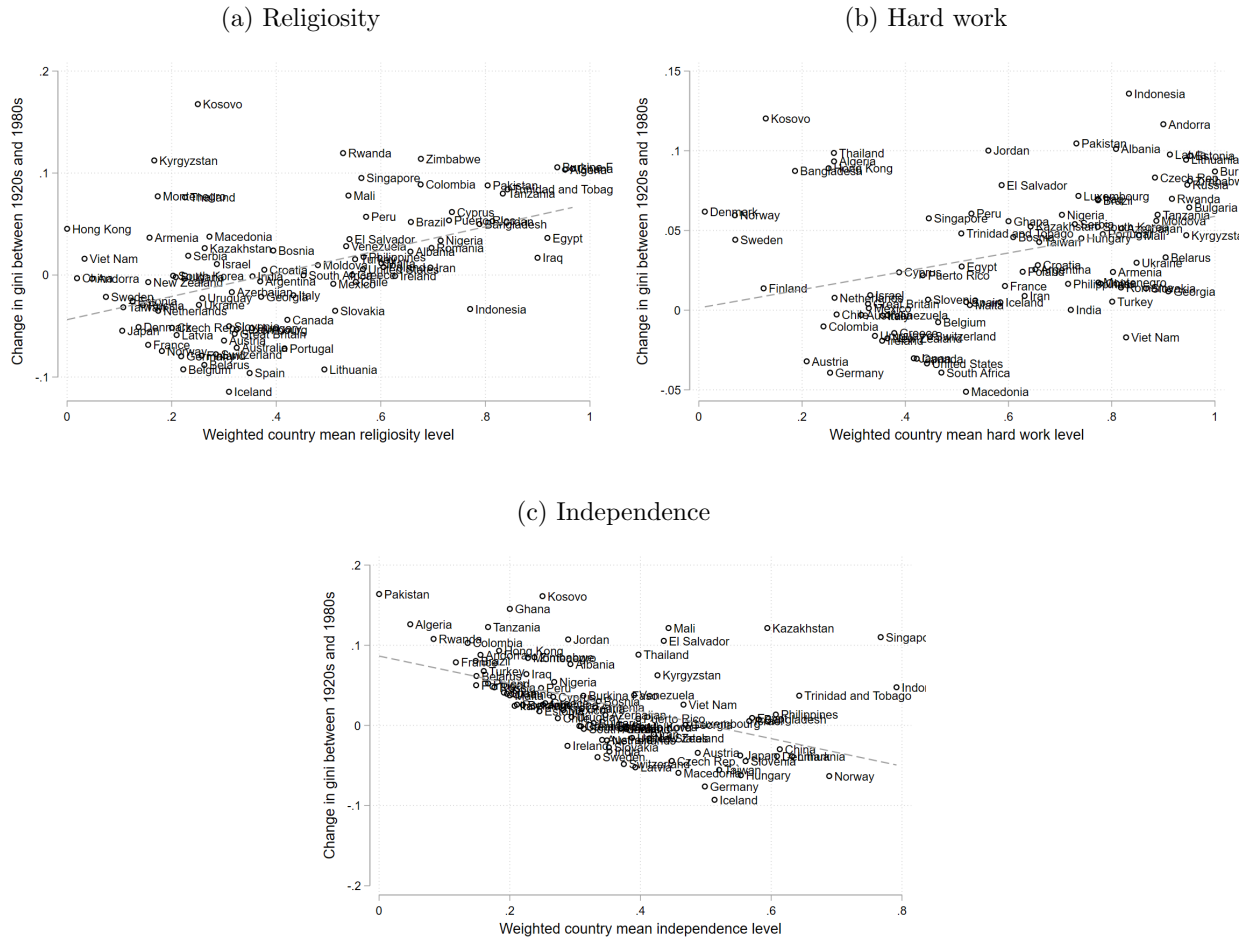
Figure A.8: R^2 of country fixed effects across birth years - across regions

(a) Western Europe and Middle east and North Africa
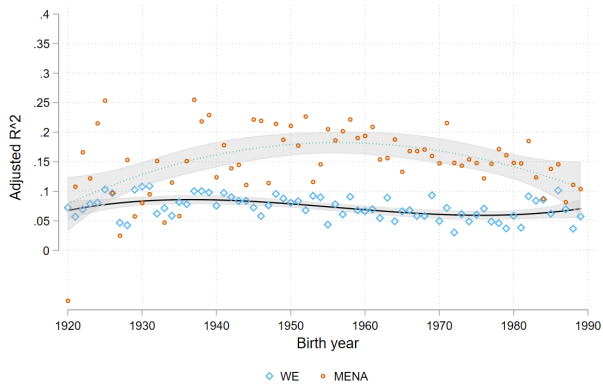
(b) Eastern Europe and Neo-Europe
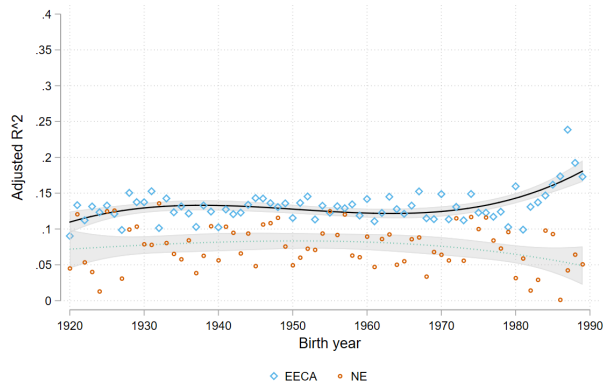
(c) South East Asia, Central Asia and South America
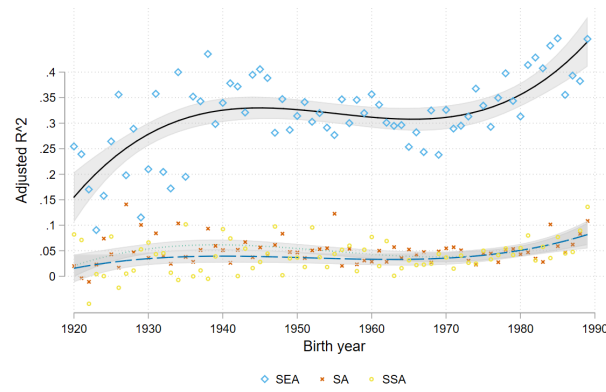
Notes: R^2 of regressions of each dimension of culture for each birth year. Each dot represents one regression. The 95 %-confidence bands are calculated using the local polynomial smooth method.

Figure A.9: Population weighted region means of religiosity

(a) Western Europe, South East Asia, and SSA
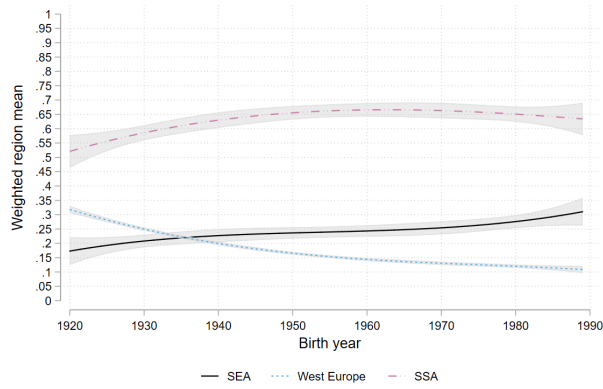
(b) EECA, South Asia, MENA, and South America
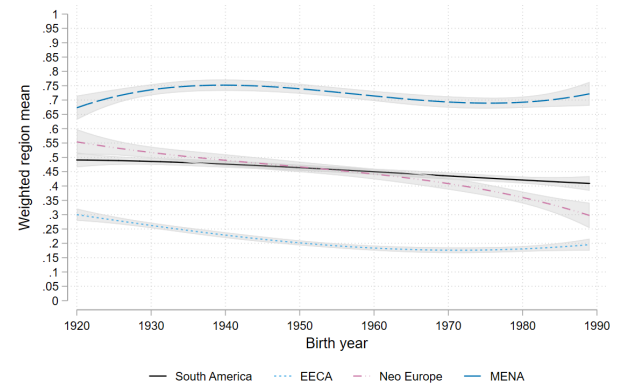
Notes: The 95 %-confidence bands are calculated using a local polynomial smooth method.

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