Sacred Canopies or Religious Markets? The Effect of County-level Religious Diversity on Later Changes in Religious Involvement

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Secularization theories such as Berger's (1967) *Sacred Canopy* argue that religious diversity leads to a decline in religious participation. Religious market models (e.g., Finke and Stark 1988) argue the opposite. Voas, Olson and Crockett (2002) found that nearly all of the vast research exploring this important question prior to 2002 was flawed due to a previously unrecognized non-causal statistical relationship between measures of religious diversity and measures of religious participation. Since then, this methodological issue has largely stymied research on this important topic. We first describe how, following Voas et al.'s recommendations, longitudinal models can overcome these problems. We then apply these methods to data measuring the religious composition of all US counties found in the Religious Congregations and Membership Studies (RCMS) from 1980, 1990, 2000, and 2010. Using multi-level longitudinal regression models, we find that greater county-level religious diversity is followed by later declines in county-level religious participation rates. The negative effect size of religious diversity is large and robust to changes in the control variables and different methods of measuring religious diversity.

Introduction

Does the religious diversity of a population affect the religious participation of the same population? Does it cause people to question the truth of any one religion and thus make them less willing to be involved in religion as some secularization theories (e.g., Berger 1967) suppose? Or, as religious economies theories claim (e.g., Stark and Finke 2000), does the presence of many religions make each religious group more competitive and eager to elicit commitment from potential followers who then increase their religiosity?

For several decades, sociologists of religion have sought to answer this important question and advance our understanding of secularization, religious economies, and other interpretations of religious change Secularization theories, drawing on classical sociological theory (e.g., Durkheim 1984; Weber 1963) and filtered through more contemporary scholars (e.g., Berger 1967; Luckmann 1967; Martin 1969; Wilson 1976; Dobbleare 1981; Chaves 1994; Bruce 2002) describe a variety of independent variables, including religious diversity, through which modern life is believed to lead to a decline in the influence of religion. However, since the late 1980s Finke and Stark (e.g., Finke and Stark 1988; Finke, Guest, and Stark 1996; Stark and Finke 2000) have championed the religious economies model, an approach that sees some aspects of modern life, especially state deregulation of religion and greater religious diversity, leading to greater, not declining, religiosity in contemporary societies. Questions about the effects of religious heterogeneity, religious pluralism, or religious diversity (we use the terms interchangeably)[1] are especially important to this debate because both secularization and religious economies models see religious diversity as being a natural outcome of economic development but they disagree concerning its effects. Thus, questions about the effects of religious pluralism are also questions about the likely fate of religion in contemporary social life.

Because of its theoretical importance, prior to 2002 a great deal of empirical research was devoted to finding out how religious diversity is related to religious participation. Chaves and Gorski's *Annual Review of Sociology* article on this topic (2001) found 193 tests of this question in 26 published articles. These tests found differing results. Most showed a negative relationship between religious pluralism and participation rates, some found no relationship, and a few others found a positive relationship.

However, most of this research ground to a halt following Voas, Olson, and Crockett's (2002) *American Sociological Review* article demonstrating that the positive and negative results were not due to the causal effects of pluralism (the term most frequently used in this debate and the term we use extensively below) but were instead due to a previously unrecognized non-causal statistical relationship (described below) that naturally arises between practically any measure of religious pluralism within a geographic area (the independent variable) and overall religious participation rates (the dependent variable). Voas et al. demonstrated using simulations that even when religious pluralism exerts no causal influence on rates of religious participation, the correlations between these two variables will almost always be non-zero. Not only did Voas et al.'s results invalidate interpretations of most past research, but their analysis suggested that there were few easy ways of identifying the actual causal effects of pluralism using commonly available data sources.

Since 2002 there have been only two major published attempts that appear, at least on the surface, to have circumvented the problem identified by Voas et al. Montgomery (2003) used set theory and specialized software not available to most researchers. Moreover, his method does not allow for the use of statistical controls to rule out the strong possibility that the correlations discovered are spurious due to other variables such as the population size and growth of the geographic areas (variables known to be strongly related to both religious pluralism and rates of

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religious participation). Koçak and Carroll (2008) followed a longitudinal method suggested by Voas et al. and found a negative relationship between religious pluralism and later changes in religious participation rates in U.S. cities in data from the late nineteenth and early twentieth century. While free of the methodological problems outlined in Voas et al, their method has not been widely applicable because it requires comparable data on the religious compositions of the same units of geography for several points in time. Such data sets are rare and are often problematic due to missing or non-comparable data.

In this paper, we use a longitudinal method similar to, but simpler than, the method used by Koçak and Carroll (2008). We use data on the religious composition of all US counties from four decades (1980, 1990, 2000, and 2010) found in the Religious Congregations and Membership Study (RCMS). Due to a variety of problems (described below) the data as originally distributed are not suitable for longitudinal analysis. However, after extensive and detailed editing of the RCMS data from each decade we have constructed a data set that is suitable for longitudinal analyses.

These data now allow for simple, straightforward, analyses of how past levels of religious diversity affect future changes in religious participation among U.S. counties in recent decades. Using multi-level longitudinal regression models, we find that net of controls, county-level religious pluralism has a negative relationship with later changes in county-level religious participation rates over the following decade. This negative relationship is strong and robust to changes in the control variables, different methods of measuring religious pluralism, and is separate from, and in addition to, the general decline in religious adherence rates after 1990 that is likely associated with the rise of religious "nones" (Hout and Fischer 2014).

Theory

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Religious diversity plays an especially pivotal role in debates concerning how modern life is affecting religion. This is because both secularization theories and religious economies theories see such diversity as naturally arising out of urbanization and economic development, but the theories disagree concerning how religious diversity affects religion. Because the mechanisms underlying the hypothesized effects of pluralism have been argued extensively elsewhere (e.g., Berger 1967, Luckmann 1967; Wilson 1976; Dobbleare 1981; Finke and Stark 1988; Finke, et al. 1996; Olson and Hadaway 1999; Stark and Finke 2000; Chaves and Gorski 2001; Bruce 2002; Montgomery 2003, Koçak and Carroll, 2008) we limit ourselves to a brief summary of the main mechanisms that have been proposed to explain the potential relationship of pluralism and religious participation.

Olson and Hadaway (1999) reviewing past research suggest that there are at least two types of mechanisms, cognitive and behavioral, through which secularization approaches see religious pluralism *diminishing* religious influence and practice. Peter Berger's (1967) book *Sacred Canopy* is the most cited exemplar of the "cognitive" mechanisms. Berger argues that religious pluralism undermines the macro and micro-level "plausibility structures" that support the believability, especially the "taken-for-granted" character of religious belief. At the macro-level, greater religious diversity makes it less likely that the state and major public institutions of society will reinforce the religious teachings, holy days, and religious practices (e.g., Sunday closing laws) of a particular religious group or any religious group. At the micro-level, greater religious pluralism in geographic areas makes it more likely (Olson and Perl 2011) that interpersonal interactions will expose individuals to conflicting rather than unified religious influences. This exposure to close up religious diversity and the lack of macro-level support for a "taken-for-granted" religious point of view can undermine the certainty that any one religious

belief is correct and raise the possibility that one's religion is merely a preference, one among many. As religious certainty declines, so does religious commitment.

"Behavioral" explanations overlap somewhat with the "cognitive" mechanisms predicting a negative effect of pluralism but they rest on theory and research that emphasizes how positive and negative social sanctions shape religious behavior independently from what individuals believe. In his essay "Web of Group Affiliations" Simmel (1955) highlights the power of conforming influences on individual behavior and identity when patterns of group membership are concentric and overlapping versus non-overlapping. Sherkat and colleagues (Sherkat and Wilson 1995; Ellison and Sherkat 1995; Sherkat 1997) argue that religious homogeneity in a person's close social ties can boost behavioral incentives to engage in religious behavior even if a person is not particularly inclined towards religion. In contrast, religious diversity undermines these conforming incentives.

Contrary to secularization theories, religious economies models hold that religious pluralism *boosts* religious participation and commitment. This can happen in at least two ways. First, in what Hill and Olson (2009) call the "effort" mechanism, Finke and Stark (1988) argue that in a diverse religious market, religious groups are forced to compete with many other religious groups. Thus, religious leaders work harder to meet the needs and preferences of potential adherents. If their efforts pay off, each competing group ends up increasing the commitment levels of current adherents and together they engage a broader proportion of the population than in societies with state-supported, presumably non-competitive, religious monopolies. Without religious competition, Finke and Stark claim (1988) that religious leaders can, without penalty, become lazy and uninterested in meeting the religious needs of the populace, a policy that leads to declining religious commitment and participation.

Finke and Stark (1988; Stark and Finke 2000) point to a second mechanism through which pluralism boosts religion in society. Hill and Olson (2009) call it the "demand matching" mechanism. When there is a broader range of religious "products" available, it increases the probability than any single person will find a religious group fitting their particular religious needs. Collectively, a diverse range of religious products better fits an assumed diversity of religious demand. This increases the proportion of the population with access to a religion that matches their preferences.

Methods

Despite its theoretical significance, after Voas et al. (2002) pointed out the flaws in the typical methods used to study this question, there have been few published empirical tests of whether religious diversity boosts or diminishes religious participation. We think this is because few researchers in this substantive subfield understand Voas et al.'s somewhat technical presentation of these issues. We thus begin this section with a "primer" that provides a fairly simple explanation of the problem that Voas et al. describe. We follow this with an explanation of why the correct use of longitudinal data is one way to avoid this problem.

The Pluralism Index

Nearly all the previous research on this topic measures religious diversity using an index commonly referred to as the pluralism index by researchers studying this topic (e.g., Finke and Stark 1988, Voas et al. 2002). The pluralism index is the complement of the Herfindahl index long used in economics to measure market concentration. The pluralism index thus equals $1 - \Sigma p_i^2$, where p_i is the proportion of all religious persons in an area belonging to the ith religious group. The "groups" can be denominations or groupings of denominational categories (e.g., conservative Protestants, liberal Protestants, etc.). See Voas et al. (2002) or Finke and Stark (1988) for a more complete description of how the pluralism index is calculated.

The pluralism index increases both with 1) an increase in the numbers of religious groups present in an area and with 2) the evenness of the size distribution of the groups in an area, e.g., two groups of equal size are more pluralistic than two groups where one is much larger than the other. Pluralism indexes can range from zero (when there is just one religious group in an area) to slightly less than one when there are many groups all of the same size. It only equals one in the hypothetical situation where each person is their own religious group. More intuitively, when the pluralism index is calculated using numbers of people belonging to each religious group, it equals the probability than any two randomly selected religious persons will belong to different religious groups.

The Source of Non-Substantive Correlations

Voas et al. (2002) explain that research attempting to measure the relationship between the religious pluralism of a geographic area (independent variable) and rates of religious participation in the same area (dependent variable) must take account of the fact that in cross-sectional data these variables will usually have a positive or negative correlation even if pluralism has no causal influence on religious participation. They refer to such correlations as being "non-causal," but we prefer the term non-substantive in order to differentiate these correlations from spurious correlations. (Spurious correlations involve causation. A spurious correlation arises from a common causal influence on the two spuriously correlated variables.) But non-substantive correlations have nothing to do with causation and usually arise among two variables that measure the same thing or very similar things in different ways. An example is the strong correlation among questionnaire items designed to measure the same thing in different ways (e.g., two measures of psychological depression) in order to construct psychological scales or indexes. Voas et al. argue that, a non-substantive correlation arises between religious pluralism and religious participation levels because both variables measure the same things in

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different ways, the characteristics (explained below) of the size distributions of the various religious groups/denominations from which both the pluralism index and the participation rate are calculated.

Voas et al. (2002:216)) summarize their claim saying that "The general principle is that when the larger denominations have the greatest size variation, [non-substantive] correlations tend to be negative, but when the smaller denominations are more variable, [non-substantive] correlations tend to be positive."

<Figure 1 About Here>

Voas et al. provide a more mathematical explanation of this claim in their appendix, but one can see the contributions of larger versus smaller denominations to this non-substantive correlation more intuitively in Figure 1 (which is based on data from the 1990 RCMS data set used by Voas et al.). In the two subfigures, the plotted points are individual counties. The vertical axes measure the pluralism index calculated for all denominations in each county and the horizontal axes show the size of a particular denomination in a county (measured here as the percentage of the county population that are adherents of that denomination). In the RCMS data "adherents" include official members of a denomination plus (for denominations that do not allow children to be members, e.g., Baptists) the estimated number of children that these official members have. Because the relationships in Figure 1 are mathematically necessary (non-substantive), not sociologically causal relationships that we are seeking to test, it does not matter which small or which large denomination we choose or which year the data come from, the relationships between group size and religious pluralism will be the same.

Figure 1a shows the relationship between the pluralism index and the size of the American Baptist Churches – USA (ABC-USA) across US counties. The ABC-USA is a moderately small denomination among the denominations in the 1990 RCMS data. About eight-

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tenths of 1 percent (a proportion of .008) of the US population were adherents of ABC-USA

congregations in 1990 and that same year the county at the 99th percentile in terms of total

population that were adherents of ABC-USA congregations had 13 percent ABC-USA adherents.

Note the positively sloping regression line and the generally positive correlation (r = .132) of the

relationship between ABC-USA size and the pluralism index. Size variation in "smaller"

denominations like the ABC-USA will tend to contribute to a positive correlation between

pluralism and overall adherence rates. Why is this? In Figure 1a, in counties plotted further to the

right, those with more ABC-USA adherents, the ABC-USA size is closer to the sizes of the

larger denominations in the data set and thus these counties have higher pluralism indexes (the

religious population is more evenly divided among denominations when the smaller

denominations are larger). In these same counties where ABC-USA sizes are larger, their larger

size also contributes positively (all else being equal) to the total adherence rate. For this reason,

the total adherence rate will also tend to be greater in counties where smaller denominations like

the ABC-USA are larger than their mean size. In other words, for smaller denominations, greater

size leads to *greater* pluralism *and greater* total adherence rates thus contributing to an overall

positive correlation between pluralism and total adherence rates across geographic units.

Figure 1b shows the relationship between the pluralism index and the size of Roman

Catholic Church, the largest US "denomination." In the 1990 RCMS data, Roman Catholics

made up 21 percent of all US adherents. Many counties have populations that are more than 40

percent Roman Catholic. The overall pattern of plotted counties reveals an inverted U-shape. If

one separately analyzes just the 1990 counties with less than 10 percent Roman Catholic

adherents, the correlation is positive (.401), but the correlation is negative (-.805) for counties

with more than 10 percent Roman Catholic. However, consistent with what Voas et al. claim

concerning larger denominations, the negatively sloping pattern of counties on the right side of

the figure have the greatest influence on the overall correlation (r = -.288) which is also reflected in the negatively sloping regression line in Figure 1b. Unlike the situation for smaller denominations, in larger denominations like Roman Catholicism the overall effect of size variation across counties is a negative relationship between denominational size and religious pluralism. In counties where Roman Catholic size is greater, the pluralism index for the county tends to be lower because a large denomination is more completely monopolizing the population (the sizes of denominations in the county are less equal to one another). In these same counties where Roman Catholic sizes are larger, their larger size also contributes positively (all else being equal) to the total adherence rate. For this reason, the total adherence rate will also tend to be greater in the same counties where larger denominations like Roman Catholics are larger than their mean size. In other words, for larger denominations, greater size leads to *lower* pluralism but *greater* total adherence rates thus contributing to an overall *negative* correlation between pluralism and total adherence rates across geographic units.

One might suppose that in most data sets the larger denominations will vary in size more than the smaller denominations (since larger denominations have a larger range of sizes over which they can vary) thus leading to a negative, non-substantive correlation. In fact, this is true in many data sets, and explains why Chaves and Gorski (2001) found more negative than positive relationships in their extensive review of past research on this topic. However, Voas et al. (2002) demonstrate that in some data sets the smaller denominations actually do vary in size more than the larger denominations leading to a positive, non-substantive correlation between the pluralism index and attendance rates, e.g., data from cities and towns in New York State in 1865 (Finke, Guest, and Stark 1996).

Voas et al. argue that a non-substantive positive or negative correlation between overall adherence and pluralism is virtually inevitable in cross-sectional data. Moreover, their simulation

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methods demonstrate that nearly all of the observed relationship between the pluralism index and participation rates found in real cross-sectional data sets is non-substantive.

In an important point that some researchers have missed, Voas et al. also note (2002:pp. 224-5) that it does not matter which measures of religious diversity (e.g., the pluralism index or some variant of the pluralism index, the size of the three biggest denominations in a geographic area, etc.) or which measure of participation (e.g., membership rates, attendance rates, etc.) one uses. All are good measures of what they are intended to measure, and the pluralism index is probably the best fit for many theories. Nevertheless, the measures of diversity and participation will usually have a large non-substantive correlation in cross-sectional data largely because they both measure the same things (characteristics of the size distributions of religious groups) in different ways.

Voas et al. make it clear that the presence of a non-substantive correlation between religious pluralism and participation rates does not rule out the possibility that religious pluralism may have an *additional causal influence* on rates of religious participation that also contributes to the overall correlation between these variables. The problem is to devise ways to estimate how much of any observed association is due to non-substantive reasons and how much might be explained by actual causal influences of pluralism and other related control variables (e.g., population density) that might affect both participation rates and pluralism.

A Longitudinal Solution

Voas et al. (2002:pp. 223-226) describe six potential methods that could be used to identify possible causal influences of pluralism on participation rates. They point out that some of these methods do not actually work. Other methods are fairly straightforward and could work, but the necessary data are not easily available. Some methods (such as the simulation methods that Voas et al. use) might be able to estimate the magnitude and direction of the non-substantive

correlation, but (because the methods do not provide a way to statistically control for the influences of other independent variables) these methods are unable to determine how much of the remaining, empirically observable, association is spurious.

One of the most straightforward solutions proposed by Voas et al. is to use longitudinal data with information about the sizes of religious groups in many geographical areas (e.g., countries, states, or counties). Importantly, the set of religious groups and the set of geographical areas should be consistent across two (preferably three or more) waves of data. Such data make it possible to examine how past religious pluralism affects future changes in participation rates *while controlling for past participation rates* (essentially the lagged dependent variable). This is the method we use here. Although the method is straightforward, its use has been limited due to the lack of reliable longitudinal data of the type needed. To our knowledge, a variant of this method has been tried and properly executed in only one previous study, Koçak and Carroll (2008).

<Figure 2 About Here>

How does such a method work? Figure 2 shows a simplified model of the needed regression for just two points in time. In fact, if only two points in time are available, OLS regression could be used. Note that in any real analysis, a regression would also control for other covariates (control variables) but for the sake of simplicity, these have been left out of Figure 2. The model shown is only slightly different from what is often referred to as a lagged dependent variable model. The variables have been labeled as the pluralism index and adherence percent (the variables used in our analyses) but other measures of pluralism/diversity or participation rates could also be used. "Adherence percent" refers to the total percent of the population that are adherents (defined below) of all religious groups added together. The two variables on the left side of Figure 1 are measured at time 1 and the dependent variable on the right side is a change

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score based on change in adherence percent from time 1 to time 2. This is one of several models that can be used.[2]

There are three reasons why one needs to include the lagged dependent variable (adherence percent at time 1) in the regression. First, the change in adherence rate between two waves will tend to have a fairly strong negative correlation with the value of the adherence rate at the beginning of the time period due to regression to the mean, an effect found in most variables measured across time in panel data. All else being equal, counties with a high adherence percent at time 1 are more likely to decline thereafter, partly because of ceiling effects and partly because of regression to the mean whereby unmeasured random forces tend to move the adherence percentage closer to a less extreme value (Finkel 1995:pp. 8-9). Conversely, counties that start out with a very low adherence percent are likely to increase in the following time period. This is why we place a negative sign on the arrow from adherence percent at time 1 to change in adherence percent. Failing to include this, often quite substantial, negative effect on the dependent variable would heavily bias the remaining estimates in model, including the coefficient for pluralism at time 1.

Second, including adherence percent at time one controls for past influences (both measured and unmeasured) on county adherence rates because these past influences will have already influenced the adherence percent at time 1. Any change in adherence rates reflected in the dependent variable must therefore be due to causes whose influence occurs either at or after time 1. If pluralism at time 1 is one of these influences, this should be reflected in its regression coefficient (assuming that the regression also statistically controls for other major causes of adherence rate change).

Third, and most importantly, the coefficient for pluralism will be uncontaminated by the non-substantive component of the pluralism-adherence rate correlation only if the pluralism

index used as the key focal independent variable is calculated from the same wave of data used to calculate the lagged adherence percent (time 1, not time 2). Figure 2 helps explain why.

Figure 2 contains two double-headed arrows between the pluralism index at time 1 and the adherence percent at time 1. Normally diagrams of regression models show only one double-headed arrow between two independent variables. Such double-headed arrows represent the covariance (which can be expressed as a correlation) between the two variables. Figure 2 separates the usual single double-headed covariance arrow into two double-headed arrows to reiterate the point that the total covariance (or correlation) between pluralism and adherence percent can, theoretically at least, be divided into a non-substantive component and a possibly causal component. Voas et al. (2002) demonstrate, using three very different data sets, that the non-substantive component is usually a very large part of the total correlation. Thus, we make the arrow for the non-substantive component fatter than the arrow for the possibly causal component.

However, use of the longitudinal method diagrammed in Figure 1 does not depend on determining the relative size of these two covariance (correlation) components. This is because regression takes *all* components of the total covariance between these two variables (both the non-substantive and the possibly causal components) into account (statistically controls for it) when estimating the independent effects of each independent variable on the dependent variable. The regression coefficient for lagged pluralism (pluralism at time 1) therefore will show the relationship of pluralism with change in adherence rates independent of the effects of adherence rates at time 1 (and any non-substantive relationship of pluralism at time 1 with adherence rates at time 1).

Simply using longitudinal data is not, by itself, sufficient to circumvent the problems noted by Voas et al. (2002). The method only works when the pluralism measure used in the

regression is calculated from the same wave of data that is used to calculate the lagged dependent variable. If, for example, the regression incorrectly uses pluralism at time 2 instead of time 1 as the focal independent variable, the regression would account for any covariance between the adherence percent at time 1 and pluralism at time 2, but the coefficient for pluralism at time 2 would then include a large non-substantive component of the relationship between pluralism at time 2 and adherence percent at time 2 (which is used to calculate the change score for the dependent variable). Similar problems develop if the regression tries to model change in adherence rate as a function of change in pluralism from time 1 to time 2 (i.e., one change score predicting another change score). In other words, while longitudinal data can solve the problem discovered by Voas et al., not all longitudinal models will give results uncontaminated by non-substantive pluralism-participation rate correlation.

Data Sources

Our data come primarily from the Religious Congregations and Membership Study (RCMS) for 1980, 1990, 2000, and 2010. The RCMS is an attempt to obtain counts of all congregations and their members (in all denominations willing to participate) with results listed separately for each US county by denomination (for details see Quinn et al. 1982, Bradley et al. 1992, Jones et al. 2002, Grammich et al. 2012, and the American Religion Data Archives website from which the original data can be downloaded). Counties are the units of analysis. In our analyses, the key variables (the total adherence percent and the pluralism index) are calculated for each U.S. county for each decade. "Adherents" include official members of a denomination plus (for denominations that do not allow children to be members, e.g., Baptists) the estimated number of children that these official members have.

Although individual years of the RCMS have been used in many past studies (e.g., Breault 1989, Olson 1999, Voas et al. 2002), to our knowledge, there are no published studies

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that use these data for longitudinal analysis. This is primarily because the data from each decade use different denomination names and different variable naming conventions, and because, over time, denominations merge, split, are added to the data, or are dropped from the data (depending on whether a denomination chooses to participate). After extensive work by two of the authors, we have compiled a longitudinal data set that uses common denominational and variable naming conventions with corrections such as missing values for variables from denominations that did not participate in particular decades.

Although the complete longitudinal data set that we created includes data from 1952 and 1971, our focus here is on the 1980-2010 data because it contains information on more denominations. In later decades, more denominations have chosen to participate. Although there are many tiny denominations and religious groups that did not participate in any given year, nearly all of the largest U.S denominations and religious groups have chosen to participate. Thus, the vast majority of church members have been included. Stark (1987) evaluating the 1971 and 1980 RCMS studies estimates that the percent of the U.S. population that are church members as counted by the RCMS is about six to seven percent less than what a fully complete census would have found. The most significant exceptions are that in most decades black Protestants are not counted very completely and until recent decades, the RCMS did not include major groups outside of Christianity and Judaism, e.g., Hindus, Muslims and Buddhists (see Grammich et al. 2012). Because we were concerned that missing sectors of religious groups (like black Christians) might substantially change our results, we ran robustness tests (described in the results section) in which we experimented with dropping large groups e.g., all Catholics. and smaller groups or denominations, e.g., Jews and Latter-Day Saints, and small Protestant denominations.

In order that our main dependent variable, the total adherence rate for each county, would be comparable from one decade to the next, and not be dependent on which denominations participated in the RCMS in a given decade, we ran most of our analyses on data using only the 51 denominations that participated in all four years from 1980-2010. These 51 include all of the largest U.S. denominations in the RCMS data as well as many small denominations. As we show below, the 51 denominations account for the vast majority of all adherents counted by the RCMS in any given year.[3]

Our regressions below also include statistical controls for a range of county-level variables taken from the U.S. census for the same year as each of the four RCMS studies used in our analysis. We merged these variables to the county-level RCMS data based on FIPS county identifier used in both data sources.

Variable Descriptions

The dependent variable in all of our regression models is a change score, the change in the adherence percent $ADHPCT_{it} - ADHPCT_{i(t-10)}$, where $ADHPCT_{it}$ is the total percentage of the county population that are religious adherents of one of the 51 denominations used in our analysis in county *i* and *t* is the time point (wave) in which the data were collected. An adherence percent of 50 percent means half the county population are adherents of a denomination in the county. The RCMS data are collected every ten years, so the change score represents the adherence percent at time *t* minus the adherence percent from the previous wave ten years earlier (*t*-10).

In the robustness tests found in the results section, we experiment with four different versions of our main independent variable, county-level religious pluralism. But for our main analyses we use the pluralism index calculated, following the formula, from the number of

adherents belonging to each of the denominations that appeared in a given year of the RCMS data.[4]

The regression models in Table 2 control for characteristics of counties that we believe are important for predicting religious change. These include the natural log of the total population, the log of decade-on-decade population growth, the proportion of housing units that are in urban areas of the county, the proportion of adults with college degrees, the proportion black, the proportion male, the proportion currently divorced, residential instability (the proportion of the population that were living at a different address one year earlier), median age, median household earnings, and the geographical location of each county among the nine categories of Census divisions.[5] All of the control variables except time, geographic region, and population growth rate are lagged variables, measured at the previous time point (t-10).

Plan of Analysis

After presenting descriptive statistics on the variables under study, we present mixed-effects regression models calculated with the Stata xtreg procedure predicting county-level religious change over time. The most complex model in our analysis takes the following general form:

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\begin{aligned}
ADHPCT_{it} - {} & ADHPCT_{i(t-10)} \\
= {} & \gamma_{00} + PLURALISM_{i(t-10)} + ADHPCT_{i(t-10)} + \gamma(w_{1i} \ldots w_{ni}) \\
& + \gamma(x_{1t} \ldots x_{nt}) + \gamma(TIME_{it}) + \gamma\big(TIME_{it} * PLURALISM_{i(t-10)}\big) + \mu_{0i} + r_{it}
\end{aligned}
$$

Where the outcome (change score) for the *i*th county at year *t* is the change over the past ten years in percent of the county population that are church adherents in one of the 51 denominations. This outcome is modeled as a fixed intercept γ_{00} plus religious pluralism (at time t-10), the adherence percent at time t-10 (the term that adjusts for the non-substantive correlations identified by Voas et al. 2002, see Figure 1), a set of time-varying controls

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$(\gamma(x_{1t} \ldots x_{nt}))$, a set of time-invariant controls such as geographic region $(\gamma(w_{1i} \ldots w_{ni}))$, a fixed effect estimate for an interaction between pluralism and time $(\gamma(TIME_{it} *$ $PLURALISM_{i(t-10)}))$, which helps assess change over time, and the error terms: a random effect estimate for the randomly varying intercept (the multilevel component μ_{0i}), and the residual error r_{it}. (For further justification of our model, see Figure 2 and its explanation in the text above.)

In less technical language, we use a multilevel regression model with times (decades of the study) nested within counties. If there were only two decades of data available, an OLS regression could be used to predict the change-score dependent variable. However, the multi-level model allows us to simultaneously draw on data from multiple decadal changes and also examine how the effects of religious pluralism may have changed from one decade to the next.

Results

< Table 1 about here >

Table 1 shows descriptive statistics for the variables in our analyses. Our dependent variable, "Change in Adherence Percentage," represents the change (over ten years' time) in the percent of a county's population that were religious adherents in one of the 51 denominations that participated in all four RCMS studies from 1980 to 2010. Between 1980 and 1990, the average county gained a small percent of religious adherents: the mean percent change in adherence across counties was about 0.46 percent. However, over the next two decades, the county mean dropped 3.4 percent and 5.15 percent respectively. Averaging the change across waves and across decades, the mean percent change in county residents that were religious adherents was approximately -2.72 percent per decade.

Table 1 shows descriptive statistics for four different ways of measuring the focal predictor, religious pluralism. Note that the RCMS data allow one to calculate the pluralism index using data either on the numbers of adherents or the numbers of congregations belonging

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to particular religious groups. Moreover, the "groups" can either be specific denominations (e.g., Southern Baptists, Catholics, etc.) or larger groupings of religious denominations merged into religious traditions. (We grouped denominations into categories of white conservative Protestant, black Protestant, mainline Protestant, Roman Catholic, Jewish, Latter Day Saints, and other.)[6] We calculated all four indexes (resulting from the combination of these two methodological choices) and did robustness checks (described in our results) to see if these different versions of the pluralism index have similar effects on change in adherence percentages. Depending on which measure is used, the county-year mean of pluralism in our data ranges from .58 to 0.82. Table 1 also shows descriptive statistics for the lagged adherence percent (the other focal independent variables) and the county-level control variables used in our models.

< Figure 3 about here >

Figure 3 shows the decadal change in the total percent of adherents graphically. The lighter, uppermost-line represents the total percent of the American population who were adherents in any denomination that participated in the RCMS study during each year shown. This line shows a sharp upward growth in religious adherence from 1980 to 1990, followed by a decline over the next two decades so that the percent of the population that were adherents in 2010 is less than one percent less than the percent in 1980 (49.67 versus 48.78). But this upper line gives a misleading view of changing adherence percentages because, in each successive decade, the RCMS included more denominations (from 111 denominations in 1980 to 236 denominations in 2010). The darker, lower line shows the same trend – the percent of Americans who are counted as religious adherents – but the darker line counts only adherents in the 51 denominations that participated in every year of the RCMS from 1980 to 2010, yielding a more comparable longitudinal trend. This lower line, shows a gradual decline in adherence from 1980

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to 2000, followed by a steeper decline from 2000 to 2010. From 1980 to 2010, religious adherence in these 51 denominations fell from about 47.8 percent to about 39.9 percent.

<Table 2 about here>

Table 2 contains a series of regression models showing that religious pluralism has a negative association with later changes in the percent of the population who are church adherents. As described in the discussion of Figure 1 above, the dependent variable is a change score, the change in the percent religious adherents from the previous wave (decade) to the current wave (decade). The focal predictor variables are pluralism and the adherence percent (both lagged by 10 years, one wave). Thus, the pluralism index and the adherence percent from 1980 are used to predict the change in percent adherents from 1980 to 1990. 1990 predictor variables are used to predict 1990 to 2000 changes in adherence and 2000 predictor variables predict changes from 2000 to 2010. All of these changes are analyzed simultaneously using the multilevel model.

The results of Model 1 in Table 2 suggest that, absent other controls, a one unit increase in pluralism predicts a 2.08% decline in adherence in the following 10 years. (As noted above and in Table 1, pluralism index values range only from zero to .93 in these data. Therefore a "one unit" increase is not quite possible, but this is, technically, what the coefficient of 2.08 means). We discuss effect size more completely below in our discussion of the margins plot shown in our final figure. As explained in the discussion of Figure 1 above, readers should not read too much into the negatively signed coefficient (-0.13**) for lagged adherence percent since. As Finkel (1995) points out, this negative coefficient arises largely from a large "regression to the mean" effect found in almost all longitudinal data.

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In Model 2, when we add the control variables to the model, the magnitude of the negative effect of pluralism increases approximately four-fold from -2.08 to -8.00. We ran tests for multicollinearity and found that the VIF for pluralism in Model 2 is less than 2.0.

We ran several types of robustness checks in which we made changes to the regression shown in Model 2 to discover whether the results were due to particular methodological choices we made or possibly due to other shortcomings of the data. First, as a robustness check, we reran Model 2 from Table 2 three more times leaving all the variables the same except that we substituted the three other measures of pluralism discussed above and shown in Table 1. In order to save space we do not include a separate table for these results, but the results are easy to summarize. When pluralism is calculated using numbers of congregations for each denomination, the regression beta is -9.73 (S.E. 1.00, R^2 combined 0.24), using numbers of adherents for each large religious tradition it is -4.93 (S.E. 0.75, R^2 combined 0.23), and using numbers of congregations in each large tradition the regression beta is -3.73 (S.E. 0.94, R^2 combined 0.23). In all regressions the coefficient for the pluralism measure is negative and the results are all statistically significant at p<0.001.

Additionally, several reviewers and we ourselves, wondered how the non-participation of particular denominations in one or more of the four decades of RCMS data used in our analysis might have affected our results. Although we cannot know what the results would have been if some non-participating denominations had, instead, participated, we can examine how sensitive the results are to rerunning Model 2 when data from one or more of the 51 participating denominations or even a whole group of denominations in a religious tradition are excluded from our analysis. By "excluding" a denomination or religious tradition we mean that we recalculated all the county adherence percentages and pluralism indexes without using data from that denomination or group of denominations in a particular religious tradition. It was as if the

excluded religious group(s) did not exist. We did this recalculation separately for each excluded group and then reran the regression from Model 2 of Table 2 with the recalculated data.

In general, the coefficient for religious pluralism is not very sensitive to excluding denominations or whole categories of denominations. The coefficients for religious pluralism when no group is excluded (the results from model 2 in Table 2) is -8.00. When Roman Catholics are excluded it is -8.98 (S.E. 0.54, R^2 combined 0.27). Excluding Jews yields -7.42 (S.E. 0.71, R^2 combined 0.23). Without Latter-Day-Saints the coefficient is -6.03 (S.E. 0.74, R^2 combined 0.23). Excluding all white conservative Protestant denominations (which includes data on a very large number of small as well as a few large denominations) yields -5.50 (S.E. 0.66, R^2 combined 0.15). Without mainline Protestants it is -7.38 (S.E. 0.64, R^2 combined 0.19). All of these coefficients are statistically significant at p< .001. Although we cannot know for sure what results would have been if certain other denominations had been included in the RCMS studies, we feel confident that the results are not very sensitive to missing information from denominations (either large or small) that did not participate.

Finally, we return to Table 2, Model 3, in which we specify a series of interactions between pluralism and the three indicator (dummy) variables for time. This modeling structure allows us to separately determine the effect of pluralism on religious adherence for each of the three time periods under study: 1980-1990, 1990-2000, and 2000-2010. The interactions between pluralism and time are displayed graphically in Figure 4.

< Figure 4 about here >

Figure 4 shows three fitted regression line for religious adherence percent change (on the vertical axis) based on pluralism 10 years earlier (on the horizontal axis). Each line represents this relationship for a separate time period, and all the lines are adjusted for all of the control variables in Table 2. The slope of these three lines give a good idea of the *effect size* of religious

pluralism, but readers should keep in mind that 90 percent of counties have pluralism indexes greater than .48 (the tenth percentile) and 90 percent have a pluralism index less than .85 (the ninetieth percentile). Thus, across the range where most counties are found, going from the tenth to the ninetieth percentile of pluralism corresponds to a predicted adherence percent change that is, depending on the decade, about two to six percent lower over the next ten years.

The topmost line in Figure 4 shows the relationship between pluralism and adherence percent change for the time period ending in 1990. The line slopes downward, showing that greater pluralism predicted more negative changes in adherence percent change, more pluralistic counties grew less and declined more than less pluralistic counties. The middle line, showing 1990-2000 results, is less sharply negative but still slopes downward. The lowest line also shows a negative slope. In all three decades, adherence pluralism is negatively associated with changes in future adherence rates, even after controlling for many other county characteristics and changes in adherence rate due to all other causes that change with time and affect all counties (controlled for by including dummy variables for each decade).

The different heights of the lines (the y-intercepts) show that in later decades the overall percentage change in adherents due to all causes, including those not in our models, became more negative. In later decades, counties were more likely to experience declines in their adherence percentage, and these rates of decline accelerated with time. Thus, the lines for later decades are plotted lower on the figure. The different heights of the lines suggest that in addition to the negative effects of pluralism, other forces have also been acting on county adherence rates to bring about an accelerating decline in county adherence rates (see also Figure 3). We suspect that these accelerating declines are largely due to the increase in religious "nones" after 1990 (Hout and Fischer 2014). Here, however, it is important to note that for all three decades, whether average adherence rates are rising, steady, or falling, the predicted *additional* effect of

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pluralism on change in adherence percent (reflected in the slope of the lines) are consistently

negative. Religiously "monopolistic" counties fare quite a bit better than religiously diverse

counties.

Summary and Conclusions

The relationship between religious diversity and participation is an important and

unresolved issue in the social scientific study of religion. Research on the effects of religious

diversity has long been stymied by the problems identified by Voas et al. (2002). We use, and

explain, one of the simplest and most straightforward methods suggested by Voas et al. (2002) to

circumvent the problems they describe. Although the method is simple, a great deal of work by

two of the authors was needed to transform the RCMS data, as originally released, into a format

suitable for longitudinal analysis.[7]

We find that religious pluralism has a negative impact on later changes in overall

percentages of church adherents among US counties for all three decades from 1980-2010. All

else being equal, counties with greater religious diversity are more likely to experience smaller

future gains or larger future declines in the percent of the population who are church adherents.

Although our results are limited to the most recent decades in just one country, they match the

negative effects of religious diversity discovered by Koçak and Carroll (2008) in their

longitudinal analysis of late nineteenth and early twentieth century cities in the U.S. Moreover,

we find that our results are robust to the addition of control variables and different ways of

calculating pluralism (using adherents, using congregations, using denominations, using whole

religious traditions and even excluding large sectors of adherents, e.g., excluding all Catholics or

all white evangelical Protestants). The results do not seem very sensitive to missing

denominations or the method of measuring group sizes.

Since the *changes* in the dependent variable occur *after* the independent variables are measured, our results dramatically strengthen, but do not prove, the claim that levels of pluralism *cause* later declines in religious participation. We do not deny that some reverse causation is possible. For example, low adherence rates might better allow religious diversity to develop. But given that the independent variables in our analysis are prior in time to the measures of the dependent variable, such mechanisms do not explain our results.

It is important to note that our results do not explain, nor are they dependent upon, the dramatic declines in the percentage of "churched" Americans since 1990 evident in figures 3 and 4 and described by Hout and Fischer (2014). All of the plotted lines in Figure 4 have a negative, downward slope, regardless of the height of the lines and the years on which the predicted values are based. In the 1980s when overall adherence percentages were rising, greater religious diversity predicts smaller gains in future adherence rates, or in very diverse areas, actual declines. Following 1990, when overall adherence percentages were falling, greater religious diversity mostly predicts greater actual declines in a county's adherence percentage. Similarly, Koçak and Carroll (2008) found that the effects of pluralism on adherence rates were negative in the late nineteenth and early twentieth century in the U.S., a time when, according to Finke and Stark (1992), overall adherence rates were increasing.

If true, the *Churching of America* from 1776 to about 1990 described by Finke and Stark (1992) likely happened in spite of, not because ofm the increasing religious diversity that developed over this same time period. Koçak and Carroll's results imply that in earlier time periods, all else being equal, more religiously diverse areas of the U.S. were churched more slowly than comparable areas dominated by one or a few religious groups, a trend that may have facilitated the general pattern found today, where the highest adherence rates are found in the least religiously diverse parts of the U.S. Similarly, our results show for the past several decades

of general church adherence decline (a pattern coinciding with the rise of the religious "nones") that more religiously diverse areas of the U.S. are declining even faster than less diverse areas. Less diverse areas such as Utah may resist the rise of the "nones" better than the most religiously diverse areas of the country such as California and Oregon.

Our results do not test all of the predictions made by religious market theories. For example, our results say nothing about the effects of religious regulation (Stark and Finke 2000). We also acknowledge that there may be other ways of measuring religious competition, the key variable in the religious economies model. But as Chaves and Gorski note (2001: 262) "analyses of the relationship between religious pluralism and religious participation have been the primary source of evidence in favor of the idea that religious competition leads to increased religious vitality." Our results directly contradict this prediction and seem more consistent with predictions made by secularization theories such as the *Sacred Canopy* arguments made by Berger (1967).

NOTES

1. Although the term "pluralism" is also used to refer to a value commitment (that social diversity is a good thing), in the literature related to our research question, pluralism is frequently used as a synonym for diversity and thus the actual measure of diversity is often referred to as the "pluralism index" (Finke and Stark, 1988). For consistency with past literature, we follow this practice and use the term pluralism and "pluralism index."

2. The same results for pluralism can be obtained if the change score dependent variable is replaced with adherence percent at time 2, but then the coefficient for the adherence percent at time 1 will equal the coefficient from the original model (shown in Figure 2) plus 1 (see Finkel 1995: pp. 6-7). As Finkel points out (see his formulas 2.5 and 2.6, pp. 6-7), the general advice to

avoid regressions where the dependent variable contains a component of one of the independent variables (as is true of a change score dependent variable controlling for the dependent variable at time 1) is unproblematic in this case. We use the change score as the dependent variable in our models since the interpretations of the results and effect sizes are more intuitive.

3. The complete list is available from the authors.

4. As an additional robustness check, we recalculated all four pluralism indexes using only the 51 denominations that participated in the RCMS during all of the four years from 1980-2010 and compared them to indexes that use all the denominations that happened to participate in each year. The results were substantively the same regardless of which set of denominations we use.

5. A reviewer suggested we include a control for average county-level household size. We reran the regression in model 2 of Table 2 with this variable and found that it was statistically insignificant and that including it did not appreciably change the coefficient for pluralism.

6. The categorization of denominations into religious traditions was done to resemble, with only a few changes, the RELTRAD categories used by Steensland et al. (2000). The coding of denominations is available from the authors by request.

7. We hope to soon complete the documentation to make this data set publicly available for use by others. A similar data file constructed concurrently with ours was developed by Rachel Bacon et al. (2018) and is accessible on the ARDA website: http://www.thearda.com/.

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Table 1: Descriptive statistics	N*	Mean / Pct.	SD	Min	Max
Dependent Var: Change in Adherence Percentage					
…1980-1990	3092	0.46	9.30	-103.60	84.58
…1990-2000	3099	-3.44	9.22	-87.84	53.48
…2000-2010	3136	-5.15	9.07	-98.63	76.38
…overall percent change in adherence rate per decade	9327	-2.72	9.49	-103.60	84.58
Focal Independent Variables					
Pluralism (lagged)					
…based on n of adherents in each denomination	9327	0.69	0.16	0.00	0.93
…based on n of congregations in each denom.	9326	0.82	0.11	0.00	0.97
…based on n of adherents in each relig. tradition	9327	0.58	0.15	0.00	0.85
…based on n of congrgtns. in each relig. tradition	9326	0.65	0.11	0.00	0.84
Adherence Percent (lagged)	9327	52.15	19.01	0.00	169.85
Control Variables					
Median age of females (lagged)	9327	35.62	4.89	19.40	63.50
Median household income (lagged)	9327	24573.53	10918.78	5750.00	82929.00
Log of total population (lagged)	9327	10.16	1.37	4.87	16.07
Log of population growth**	9327	0.06	0.14	-1.68	1.07
Proportion. with college degree (lagged)	9327	0.09	0.05	0.01	0.48
Proportion black (lagged)	9327	0.09	0.14	0.00	0.86
Proportion foreign born (lagged)	9327	0.03	0.04	0.00	0.51
Proportion male (lagged)	9327	0.49	0.02	0.10	0.99
Proportion divorced (lagged)	9327	0.06	0.02	0.00	0.16
Proptn. not in current residence for 1 yr. (lagged)	9327	0.20	0.04	0.02	0.52
Proportion households in urban areas (lagged)	9327	0.37	0.30	0.00	1.00
Region					
New England	67	2.14			
Mid-Atlantic	150	4.78			
East North Central	437	13.93			
West North Central	618	19.71			
South Atlantic	589	18.78			
East South Central	364	11.61			
West South Central	469	14.96			
Mountain	280	8.93			
Pacific	162	5.17			

* Descriptive statistics are based on values from 3,136 counties over three consecutive decades for a total of 9,327 county-year observations.

** Calculated by taking the natural log of the ratio of the total population divided by the total population at the most recent previous wave: $\ln(\text{population}_t/\text{population}_{t-10})$

Table 2: Regression models using lagged religious pluralism to predict change in percent adherents during the next ten years
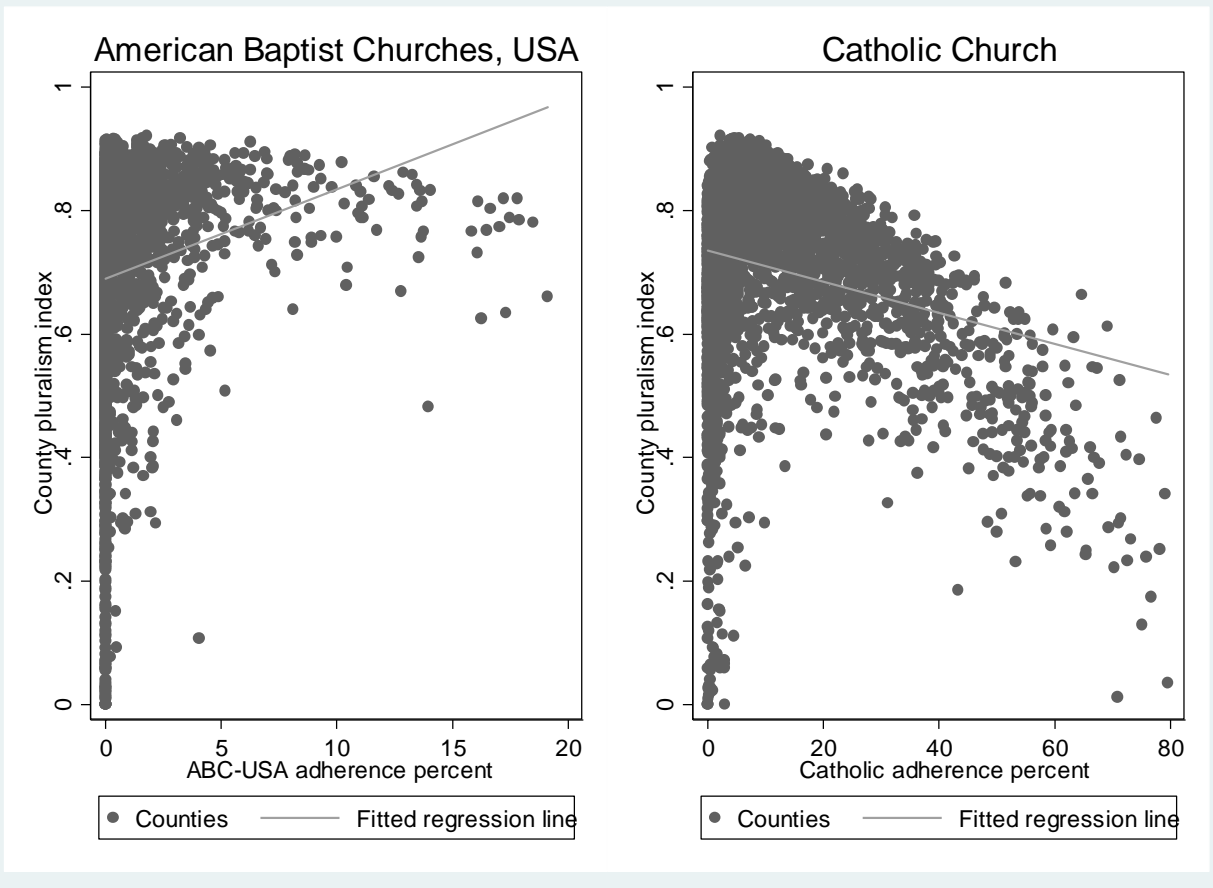
	Model 1 b(se)		Model 2 b(se)		Model 3 b(se)	
Focal Predictors						
- Lagged denomination-based adherence pluralism	-2.08**	(0.63)	-8.00***	(0.70)	-12.16***	(1.02)
- Lagged adherence percent	-0.13***	(0.01)	-0.24***	(0.01)	-0.24***	(0.01)
Pluralism X year interaction						
- Pluralism X 1990					0.00	(.)
- Pluralism X 2000					8.52***	(1.35)
- Pluralism X 2010					4.82***	(1.29)
Control variables						
- Log of total population (lagged)			-0.11	(0.13)	-0.11	(0.12)
- Log of population growth[1]			-18.80***	(0.82)	-18.83***	(0.82)
- Prop. households urban (lagged)			2.34***	(0.53)	2.56***	(0.53)
- Prop. with college degree (lagged)			2.13	(2.90)	1.88	(2.89)
- Prop. black (lagged)			-6.85***	(0.82)	-6.90***	(0.82)
- Prop. foreign born (lagged)			-10.41***	(2.95)	-10.27***	(2.94)
- Prop. male (lagged)			-57.87***	(4.76)	-58.42***	(4.74)
- Prop. divorced (lagged)			-76.60***	(8.60)	-77.40***	(8.57)
- Prop. not in same residence 1 year ago (lagged)			-40.83***	(5.05)	-42.64***	(5.05)
- Median age of females (lagged)			0.27***	(0.04)	0.28***	(0.04)
- Median household income (lagged)			0.00***	(0.00)	0.00***	(0.00)
Year:						
- 1990			0.00	(.)	0.00	(.)
- 2000			-1.55***	(0.37)	-7.37***	(0.99)
- 2010			-5.47***	(0.60)	-8.64***	(1.05)
Census division, lagged:						
- New England			0.00	(.)	0.00	(.)
- Mid-Atlantic			1.17	(0.75)	1.12	(0.75)

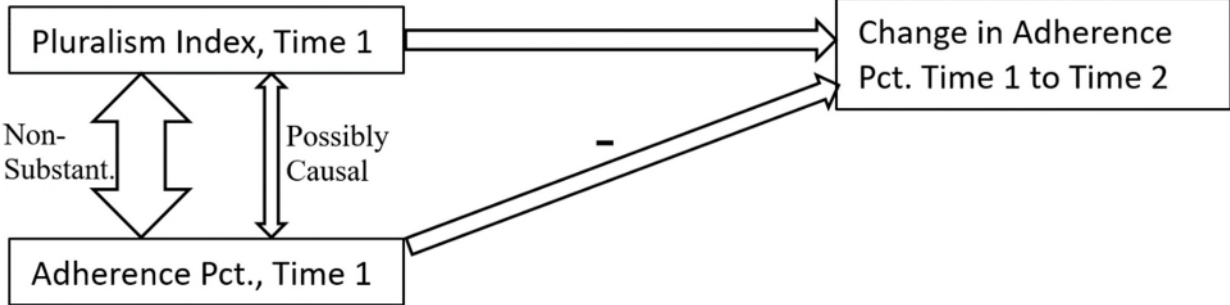|						
- East North Central			2.72***	(0.70)	2.64***	(0.70)
- West North Central			5.54***	(0.72)	5.41***	(0.71)
- South Atlantic			3.98***	(0.70)	3.84***	(0.70)
- East South Central			6.39***	(0.72)	6.29***	(0.72)
- West South Central			7.30***	(0.72)	7.20***	(0.72)
- Mountain			5.76***	(0.73)	5.68***	(0.73)
- Pacific			3.49***	(0.77)	3.46***	(0.77)
Intercept	5.31***	(0.59)	43.86***	(3.21)	47.11***	(3.25)
Observations	9327		9327		9327	
Counties	3136		3136		3136	
R^2 combined	0.060		0.237		0.240	

1: Calculated as the log of the ratio of current population divided by the population ten years prior.
Standard errors in parentheses
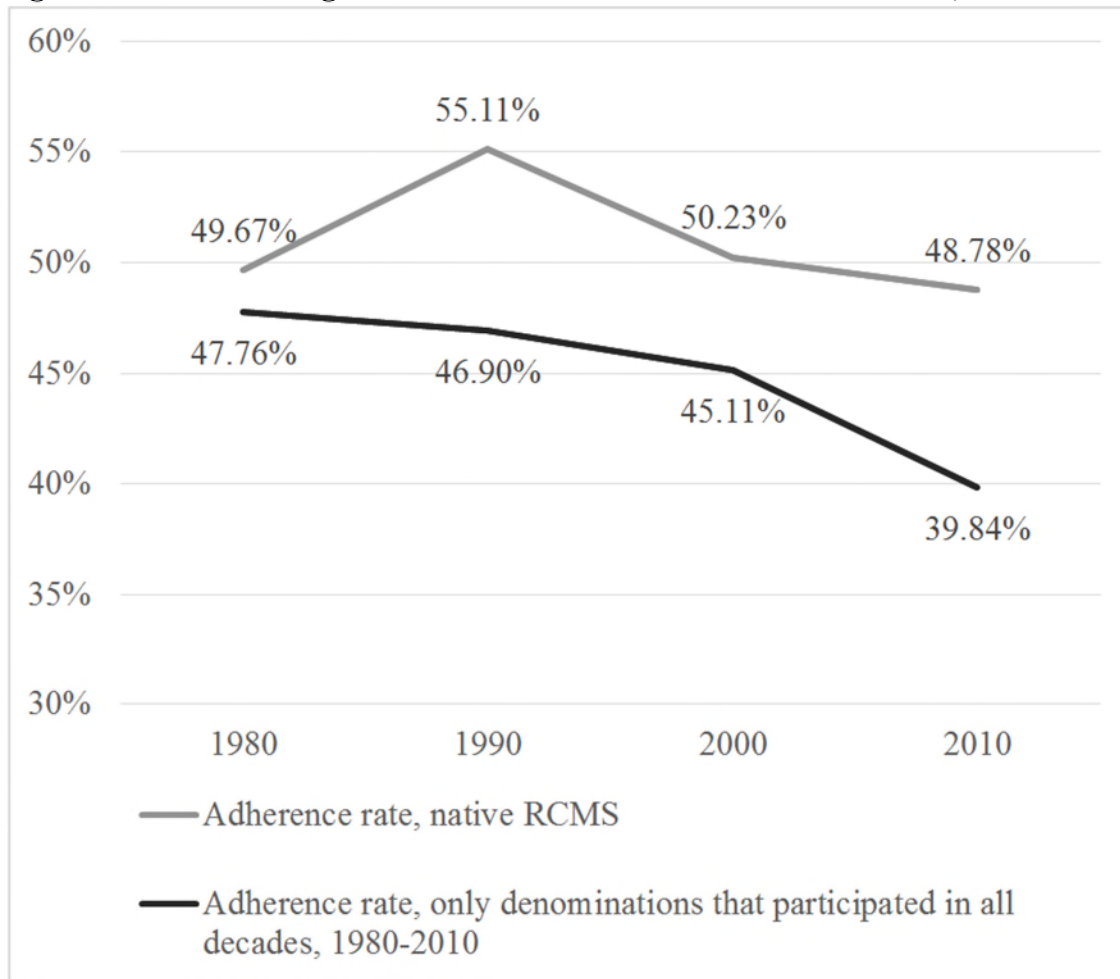$^{*} p < 0.05,$ $^{**} p < 0.01,$ $^{***} p < 0.001$

Figure 1: Demonstration of non-substantive correlations

Figure 2: Regression visualization

Figure 3: Trends in religious adherence over time in the United States, 1980-2010

Note: Values reflect the national percent of the population who are adherents (members or children of members) of any denomination, based on county-level data from the Religious Congregations and Membership Study (RCMS).

Figure 4: Predicted 10-year change in county adherence percent by decade
(Plot of interaction from Table 2, Model 3)