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A District-Level Examination of Demographic Trends and Membership Trends within LCMS Districts

by George Hawley

Introduction

This short paper examines the demographic trends within the individual LCMS districts in the United States and discerns which of these predictors apparently play a role in the denomination's membership trends. This paper was created with the expectation that family formation patterns within these various districts are predictors of the denomination's health — that is, in places with high rates of marriage and childbirth, the LCMS is suffering a less severe decline. The forthcoming results provide confirmation of this suspicion, with some caveats.

As is always the case when performing and examining studies of this kind, caution must be exercised when drawing inferences from these results. Strong correlations do not necessarily imply a causal relationship. The relatively small number of total districts precludes the use of a highly sophisticated regression analysis; when the total units of observation within a study are small, a regression analysis will quickly run out of degrees of freedom, limiting the ability to test relationships while holding a large number of additional covariates constant. That said, the fact that these results are congruent with expectations is highly suggestive that the relationship between aggregate trends in the family and trends within the LCMS are connected and the apparent relationship is not spurious.

For more information regarding the theories that motivate this brief study, please see the much larger report I submitted to the LMCS leadership.

A Note on Data

This study primarily differs from its predecessor in that it uses membership data provided by the LCMS. In my previous study, I relied primarily on data provided by the Association of Religious Data Archives (ARDA). The particular data sets I examined for that previous report were based on surveys conducted by researchers unaffiliated with the LCMS. These surveys examined church membership at the county level, and included all major denominations in the United States. These surveys' units of analysis were highly advantageous. Because they were organized at the state and county level, it was straightforward to merge them with demographic data from the United States Census Bureau and the many surveys it conducts (especially the American Community Survey).

Unfortunately, relying exclusively on these studies may be problematic. A brief comparison of the ARDA data and internal data compiled by the LCMS showed that the two were not always congruent. Thus an additional study that looked at similar data using LCMS numbers is a useful addendum to the earlier analysis.

Also unfortunately, the LCMS internal data lacked the key advantage of the ARDA data. The LCMS districts do always conform to state boundaries. Looking at the internal LCMS district maps, it also appeared that they did not even always conform to county boundaries.

Before conducting any empirical analysis of the demographic attributes of the various LCMS districts, it was first necessary to generate a new file in which every U.S. county was categorized according to its LCMS district. In the few cases where it looked like the LCMS boundaries did not perfectly align with county boundaries, I used my best judgment. I have provided the LCMS with this file, which may be useful for future studies.

Following the creation of this new data set, it was possible to merge census level data with LCMS districts.

It is worth noting that, even with the creation of this new file, there were limits to the amount of data available. Specifically, the United States Census Bureau does not provide detailed county-level information for a particularly long period of time. For many of the most important

variables in this study, our results go no further than the year 2000.

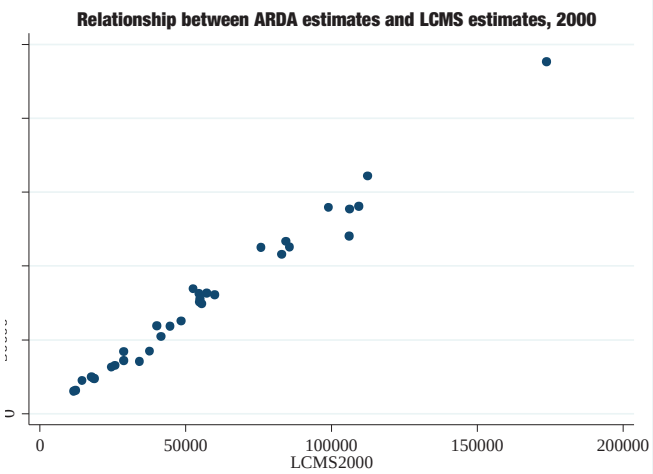
That being said, this should be sufficient for our purposes. During the 1980s and 1990s, the LCMS experienced a period of general stability when it comes to total numbers (though on other measures, such as changes in the median age, there may have been some important developments). Our primary interest should be in the cause of the most recent steady decline, which really began in the late 1990s.

One thing that must be remembered when conducting or examining a study such as this is that the Census data refer to the aggregate population, which includes both LCMS adherents and everyone else. In all states, counties, and LCMS districts, LCMS adherents are only a small fraction of the total population, even in places where the LCMS is comparatively strong. Thus, we cannot know with any certainty whether the dynamics within the LCMS population are generally similar to what we see in the aggregate data. When performing studies such as this, we must keep in mind what social scientists call the ecological inference problem, which arises when we use aggregate numbers to reach conclusions about a smaller subset of the population or of individuals. Although the forthcoming results are generally congruent with our expectations, we must acknowledge the limits of what we can definitively conclude.

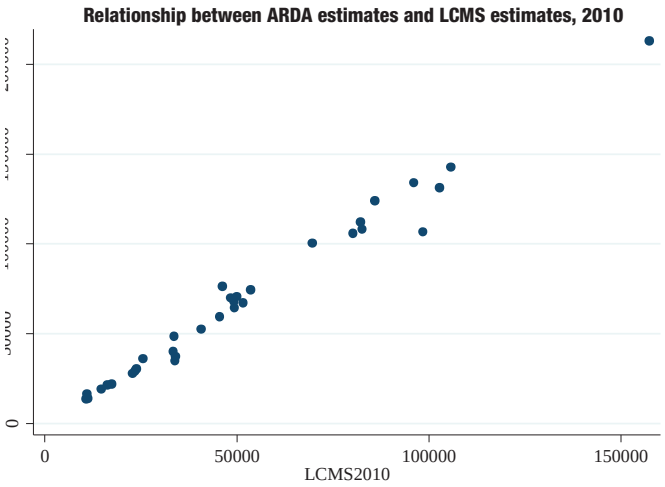
Comparing ARDA and LCMS Numbers

As much of the earlier study's conclusions were based on numbers from the ARDA data, it will be useful to see the degree to which these data are congruent with LCMS's own numbers. I should begin by noting that we should not expect perfect congruence, as the two surveys measure different things. The LCMS internal numbers include baptized and confirmed members. The ARDA surveys asked congregations to estimate their total number of adherents, both the baptized and confirmed members, as well as the frequent visitors who may not officially belong to the church.

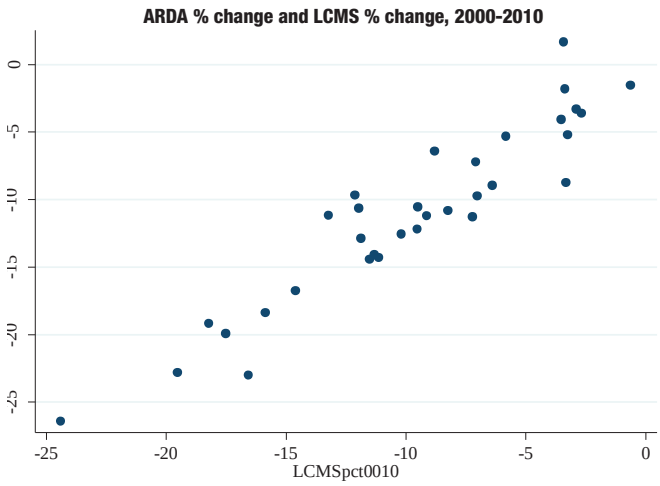
As expected, these numbers were not the same, but they were highly correlated. In 2000, the Pearson's R correlation coefficient for the ARDA data and the LCMS internal data was an extraordinary 0.99. This statistic, which ranges between negative and one, indicates the degree to which two variables are related. A value of negative one indicates a perfect negative correlation, zero indicates no correlation, and one indicates a perfect positive correlation. We can see the degree to which these data are congruent in the following figure:



We see that the relationship is similarly congruent when we compare the 2010 ARDA data with the 2010 LCMS data. Once again, the correlation was 0.99. That relationship can also be demonstrated visually.



Given the congruence between these figures, we should not be surprised to see a similar congruence when we look at how the two data sets compare when we consider the percentage change for the LCMS. On this measure, the correlation was slightly less strong (0.94), but still indicative that the two sources of data are in agreement. The relationship between these two sources of data when it comes to the percentage change in the LCMS between 2000 and 2010 can also be demonstrated visually.



The lesson from this is that, although the numbers from ARDA and the LCMS internal numbers are not identical (again this is to be expected, as the two sources of data measure different things), there is no evidence of any systematic differences. If the ARDA data indicate a major change in LCMS membership, we can expect that the internal LCMS numbers will show the same thing.

These results additionally demonstrate that my own new county file for the LCMS districts is accurate, as this is the file I used to make estimates using the ARDA county files.

This finding also provides additional evidence that the conclusions drawn from my previous study, which relied exclusively drawn from ARDA data, are sound.

Correlates of LCMS Percentage Change

This study begins from the premise that trends in the family will be related to membership trends within the LCMS. As is the case for most established Christian denominations in the United States, LCMS affiliation tends to be an inherited trait; if you belong to the LCMS, it is likely that your parents belonged to the LCMS, or you married an LCMS member and subsequently joined the LCMS.

However, there are different ways to measure family formation. We can look at the total birthrate or we can look at the birthrates of a particular racial/ethnic group. In the case of the LCMS, it may make sense to focus on the birthrates of non-Hispanic whites, as non-Hispanic whites account for more than 90 percent of the denomination. We may wish to focus exclusively on births within marriage. We may even want to look exclusively at marriage rates.

Rather than determine the proper measure of family formation via a priori reasoning, it makes more sense to examine all of these measures and determine which appears to have the strongest relationship. Beyond measures of family formation, I also examined each district's median age and its overall population change — the percentage change in total population.

In the forthcoming table, I provide correlation coefficients between all of these variables and the percentage change in membership for the different LCMS districts between 2000 and 2013. All of these variables were drawn from the American Community Survey five year estimates. These data were originally organized at the county level, which I then merged with the LCMS district file, and weighted each county according to its population.

Pearson's R Coefficients for LCMS Pct Change, 2000-2013*	
White Birthrate	0.50
White Marriage Rate	0.42
Total Birthrate	0.45
Total Marriage Rate	0.36
% White	0.35
White Married Birthrate	0.32
Total Population % Change, 2000-2013	0.14
Median Age	-0.14

*All Census data from 2014 estimates

Looking at all of these variables, we see that the strongest relationship was between the total white birthrate (measured as the percentage of women of childbearing age that gave birth over a given year) and LCMS membership percentage change. Although there is no hard rule about this, we generally consider a correlation coefficient above 0.5 a moderate correlation, a coefficient between 0.3 and 0.5 a low correlation, and if it is below 0.3, we can say there is little or no linear correlation between two variables.

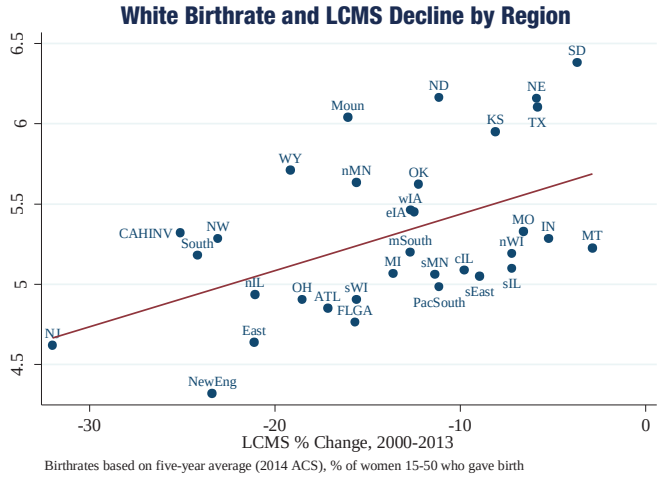
The white birthrate is the only variable that exceeds the moderate correlation threshold. In terms of relationship strength, this variable is followed by the total white marriage rate, the total birthrate, the total marriage rate, the percentage of the district that is non-Hispanic white, and the white married birthrate. We can reasonably say that there is no meaningful correlation between the district's median age or total population change and trends within the LCMS districts.

Birthrates and Change in LCMS Membership, 2000 through 2010

Although correlation coefficients can give us some

indication of the relationship between two variables, they are limited. They can tell us nothing about the presence of outliers, for example. Further, if there is a non-linear relationship between two variables (such as a quadratic relationship), this will not be picked up by a Pearson's R correlation.

Given the data we are working with, a visual exploration of these variables will be sufficient to make sense of this relationship. The relationship between white birthrates (the variable most strongly related to trends in the LCMS) and the percentage change in each district between 2000 and 2013 can be seen in the figure below.



In the above figure we see a clear, linear relationship. On average, districts with higher birthrates for non-Hispanic whites saw smaller declines in their number of confirmed members. The strength of this relationship is even more impressive when we consider the relatively crude measure we are using — birthrates for the entire non-Hispanic white population, as opposed to just the birthrates for members of LCMS congregations.

Based on a simple bivariate regression, we can say that a one percentage point increase in the non-Hispanic white birthrate was associated, on average, with a seven percentage point increase in an LCMS district's percent change over this thirteen-year period.

Birthrates and Change in LCMS Adherents Rates, 1971-2010, ARDA Data

Unfortunately, county-level data regarding birthrates and marriage rates are not easily accessible prior to the year 2000. This precludes making estimates for these variables for each of the individual LCMS districts for earlier years.

However, general data about the overall birthrate at the state level are available from a number of sources. And as we have seen, the relationship between LCMS internal membership numbers and the ARDA data sets are generally congruent. We can thus examine these same trends to see if the relationship has been similar throughout the last four decades — the first ARDA estimates for the LCMS at the state level were created in 1971.

There is a problem with relying on the ARDA data rather than the LCMS districts, however. Although there is a large standard deviation (about 34,600 in 2010) in the LCMS population in each district, the standard deviation for individual states is much larger (about 45,000). When using state-level data, we have a problem due to the large number of states that have only a tiny number of LCMS adherents. In such states, a very small change in the total number of adherents over a ten-year period would register as a very large percentage change in the total number of adherents. In a state with a much larger baseline LCMS population, such a change would barely register when it comes to total population change. This does not mean that such an analysis is not worthwhile, but we should look at the results with a more skeptical eye.

To see if this relationship has been consistent over time, I looked at the percentage change in LCMS adherence numbers for each state, and then examined how this tracked the total fertility rate at the state level at the end of that decade.

It is interesting to see that this relationship, while always present, has not been consistently strong.

During the 1970s, the relationship between birthrates and LCMS adherence rate change was actually stronger than it was between 2000 and 2013. The correlation coefficient for these variables in that earlier time period was 0.55.

However, this relationship was much weaker during the 1980s and the 1990s. In fact, this correlation dropped below the threshold for "low correlation," and we cannot reject the possibility that there was no meaningful correlation between these variables during that period.

Drawing conclusions from this finding is challenging. When working with the ARDA state data we have both the problem of using a crude measure (total birthrate), which can lead to problems of ecological inference, combined with the problem of very different baseline populations of each state. I thus hesitate to say that these

results tell us anything conclusive.

It is nonetheless interesting to note that the relationship between birthrates and LCMS change seems to be stronger during periods of membership decline. The LCMS experienced a short but sharp decline in the 1970s, followed by two decades of relative stability, and then a more serious and extended period of decline that began around the year 2000.

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