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**Conference Paper**

## The More Religiosity, the Less Creativity Across US Counties

55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Adam, Okulicz-Kozaryn (2015) : The More Religiosity, the Less Creativity Across US Counties, 55th Congress of the European Regional Science Association: "World Renaissance: Changing roles for people and places", 25-28 August 2015, Lisbon, Portugal, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

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# The More Religiosity, the Less Creativity Across US Counties

Draft: 01/27/15

## Abstract

It is not an overstatement to say that creativity is the single most important ingredient for broadly understood progress (technological, economic, social, academic, and so forth). Rapid automation makes creativity increasingly important, because non-creative tasks can and will be automated. It is striking that there are hardly any studies about the link between religiosity and creativity. Religion is a powerful and persistent force shaping human society. This study investigated the relationship between religiosity and creativity across US counties. Religiosity was measured as adherence and church density. Creativity was measured as a proportion of people in occupations classified as creative and patents per capita. Results indicate that religious counties are less creative, even controlling for education, income, political orientation, urban-rural continuum, and prevalent industry. Directions for future research are discussed.

KEYWORDS: RELIGION, RELIGIOSITY, CHURCH, CREATIVITY, CREATIVE CLASS, PATENTS, US COUNTIES

Creativity is arguably the single most important ingredient for broadly understood progress. Progress in any field depends on it. All science and all business activity critically depend on creativity and innovation. For instance, IBM 2010 Global CEO Study surveyed over 1,500 Chief Executive Officers from 60 countries and 33 industries, and they said that—more than rigor, management discipline, integrity or even vision—success will require creativity (<http://www-03.ibm.com/press/us/en/pressrelease/31670.wss>). Creativity is increasingly important because we have just began an unprecedented automation—from Google car, pilot-less civilian and military aircraft to automated journalism (Brynjolfsson & McAfee 2014).

Of course, a key question is how creativity is triggered—what are the antecedents of creativity? There are many insights (e.g., Christensen 1997), but this study takes a social perspective. Sociologists Berger & Luckman (1966) persuasively showed that reality is socially constructed. More recently social psychologist Fiske (2009) reminded us that we are social to the core. Creativity is situational/social in at least 2 ways: 1) creativity is socially constructed—creative ideas are a result of social interaction and exchange; 2) creativity is socially awarded—an idea is only creative if deemed so by a society or a group/field. Richard Florida has coined term “creative class” that conveys well the idea that creativity is social (2008). Csikszentmihalyi (1999) has pointed out that creativity is a social phenomenon—creativity does not happen within a person—it is society, or precisely speaking, the field, that determines what is creativity and what is not. More recently, the idea that creativity is fundamentally social has been elaborated by Glăveanu who suggested “We-paradigm” of creativity (e.g., Glăveanu 2010).

Religion is a powerful force shaping society. Following Neuberg et al. (2014), this study started with an assumption that religion is more than just a set of beliefs, but also community practices, socialization functions, organizational structures, and other elements. In short, religion is a powerful force shaping society. Religion is persistent. Eighty five percent of World population has some religious belief, and 94% of the US population believes in God (Sedikides 2010). Because it is so widespread, religiosity must have served some useful function. Fundamentally, it was necessary for humans to exercise a substantial restraint and trust each other in order to build civilization (Freud et al. 1930). Religion can be understood as a cultural adaptation that helped human species by promoting socially beneficial behaviors, such as self-control (Rounding et al. 2012). Likewise, there is some evidence that religion promotes pro-sociality (Norenzayan & Shariff 2008), and socially desirable responding (SDR)—for a meta-analysis see Sedikides & Gebauer (2010). The question remains how all of the above that comes with religion—restraint, self-control, and socially desirable responding—affect creativity.

Strikingly, there appears to be very little research on the link between religion and creativity. Mumford (2003) in his review of creativity research did not mention religiosity, neither did Hammond et al. (2011) in their recent meta-analysis of individual level antecedents of innovation at work. Hunter et al. (2007) focused specifically on situational aspect of creativity in their meta-review, but again, there was no mention of religiosity.

Research about similar topics points to a negative relationship. For instance, Dollinger (2007) found that conservatives are less creative. Republicans and conservatives, who also tend to be religious, trust in science least (Gauchat 2012). It is political and religious liberals that tend to support more radical scientific revolutions (Sulloway 2009). In a historical line of research about development of civilizations and cultures, which was reviewed by Simonton (2003), there is some mention of religiosity and creativity and it appears that in the long run, at culture or civilization level, religion is benign or even helpful for creativity. Finally, there is a longstanding conflict between religion and reason or science. Philosophers, especially during and after the Enlightenment were pointing out contradictions between religion and reason. A list is long and includes some of the most profound thinkers such as Nietzsche & Parkes (2005), Marx & Engels (2012), Marx (2010), Freud et al. (1930). An outspoken denouncer of religions' limitations and their hampering of reason, science and progress is Richard Dawkins (2004, 2006a). When it comes to creativity, it is useful to think of religion as a meme, a replicator, a transmitter, a term coined by Dawkins (2006b). Religion is a replicator—it replicates itself and its dogma longitudinally (from generation to generation), and horizontally (across population). As religion replicates itself, it also replicates the old ideas or even old modes of thinking and in this sense it can be conceptualized as an adversary of new (and creative) thinking.

It appears that religiosity has a rather traditional or backward-looking paradigm, not conducive for (disruptive) innovation. Religious people frequently seem to be willing to embrace diversity to lesser degree than nonreligious people (Hall et al. 2010)—and diversity or tolerance is conducive for creativity (Florida 2008). Creativity is about challenging the tradition. Religion is tradition. For centuries churches prevented the spread of new ideas for fear of losing their privileges. When knowledge of the past is highly valued and when an organization has a hierarchical structure, they generally see novelty as a threat (Csikszentmihalyi 1999). Religious behavior is about following rules (e.g. Ten Commandments), creative behavior is about breaking the rules (Gino &

Wiltermuth 2014). There is a useful concept of lateral thinking (De Bono 2010), thinking that generates new patterns (i.e. creativity) by challenging or removing status quo, assumptions, rigidity and dogma in a provocative and possibly perverse way. This is rather different from prescriptions given by religions. Given the above, it was hypothesized that there was a tradeoff between religiosity and creativity.

What is the mechanism, how religiosity can impact creativity? Day (2005), one of the only two studies specifically focusing on the topic, pointed out that some scholars associate religiosity with authoritarianism, close-mindedness, restrictiveness, divisiveness, and intolerance. The second study focusing on the topic, Zysberg & Schenk (2013), also pointed to indirect evidence: religious persons tend to be more authoritarian, while creative persons tend to be more open to experience. Openness to experience is probably the key in linking religiosity to creativity, because it rather strongly predicts both religiosity and creativity (McCrae 1987, McCrae & Sutin 2009). Also, religiosity is often associated with intolerance—for a review see Hall et al. (2010). At the same time, Florida (2008) claimed that tolerance (along with talent and technology) is a key prerequisite for creativity. Likewise, religious conservatism is thought to correlate positively with Altemeyer RWA scale, which in turn correlates negatively with divergent thinking (a measure of creativity)—for a discussion see Dollinger (2007). On the other hand, Day (2005) cautioned that religiosity may also have a positive association with creativity. Undergoing religious experience is similar to creative activity, religious schemas organize information in creative ways, and religious motivation is associated with internal loci of control, which in turn has been related to better problem solving. Likewise, Zysberg & Schenk (2013) argued that there is likely to be a relationship, but did not find conclusive evidence, and called for more research. Hence, it is clear that religiosity affects creativity in some ways, but it is not clear what is the net effect.

Echoing Rentfrow et al. (2008), I argue that a study of psychological phenomena at macro level contributes to our understanding. It is interesting to investigate what makes a person creative, but it is equally interesting to investigate what makes an area creative. Another reason to use aggregate data is that self-reported creativity measures have limitations, notably self-serving and social desirability biases, as pointed out by Zysberg & Schenk (2013). Furthermore, as argued here, creativity is social or situational or even cultural phenomenon. Also, there are striking differences in creativity across US counties. Religiosity differs substantially across counties, too. In what follows their relationship is explored.

## Method

Secondary datasets at county level were used in this study. Almost all US counties were used (about 3,000 depending on the measures used). The outcome of interest, creativity, was measured as a proportion of people employed in creative occupations (creative class) and patents per capita. Religiosity was measured as adherence and church density.

## Measures

**Creative class:** proportion of people in creative occupations (2000). Following Florida (2008), a concept of creative class was used to capture creativity. Creative class was defined as proportion

of people in creative occupations. A modified version of dataset produced by USDA (US Department of Agriculture) researchers (McGranahan & Wojan 2007) was used. Creative class was measured as proportion of people in occupations that require creative thinking. Creative thinking for occupations was calculated by ONET (<http://www.onetonline.org/find/descriptor/result/4.A.2.b.2>).

**Patents:** (number of patents from 2000 to 2011 / population in 2005). Patents arguably measure creativity (Huber 1998, Simonton 2012). Data came from United States Patent and Trademark Office (USPTO) available at [http://www.uspto.gov/web/offices/ac/ido/oeip/taf/countyall/usa\\_county\\_gd.htm](http://www.uspto.gov/web/offices/ac/ido/oeip/taf/countyall/usa_county_gd.htm). Patent origin was determined by the residence of the first-named inventor. Patents were distributed by year of patent grant. Patents variable as used here was calculated as total number of patents over 2000-2011 period divided by resident mid-population (2005). Population data came from ICPSR county characteristics (<http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/20660>). Patents were summed over 2000-2011 to adjust for short-term fluctuations to capture better creativity of an area. A strength of this measure is that it measures at least some of the implementation of a creative idea; that is, a creative act can be thought of as not only a creative idea but also a successful implementation of that idea—patent measures this initial step towards successful implementation. A limitation is that one patent is not equal another patent—some are much more valuable than others. Commercial or scientific value of patents, however, is neither obvious nor straightforward to estimate, and is left for the future research.

**Adherence:** adjusted number of adherents / population (2000). I used adjusted rates of adherence per population (2000) from ARDA (<http://www.thearda.com/Archive/Files/Descriptions/RCMSCY.asp>), which according to Finke & Scheitle (2005) is the most complete enumeration of religious congregations and their members by counties. However, some denominations, groups, race and ethnicities were under counted. Finke & Scheitle (2005) corrected the adherence rate and calculated the adjusted rate that was used in the present study.

**Church density:** number of churches in 1952 / population in 1950. Data came from ARDA <http://www.thearda.com/Archive/Files/Descriptions/CMS52CNT.asp>.

Self-report forms were completed by all participating religious bodies. Every denomination listed in the Yearbook of American Churches was originally approached by The National Council of Churches. Of the 251 religious bodies listed in the Yearbook, 114 chose to participate in the enumeration. This measure was chosen in an attempt to capture a temporal precedence of religiosity to creativity using a stable religiosity measure—churches move less often than adherents do.

## Results

There was a strong local (county level) variation in patents. Among 10 most patent-dense (patents / population) counties, there were some obvious ones, such as small Los Alamos NM housing a large national laboratory (26/1m). The second highest density was perhaps surprisingly

in Hays TX (50/1m), a county between Austin TX and San Antonio TX. An expected winner (52/1m) was Santa Clara CA, home to Silicon Valley. On the other side of the continuum were less known counties, most of them rural—none of the bottom 10 counties had more patents than .05/1m, while all top 10 counties had more than 25/1m patents. Creative class varied less dramatically. Creative class and patents correlated moderately ( $r=.53$   $p<.001$ ). On the other hand, church density in 1952 and adherence in 2000 almost did not correlate ( $r=.05$   $p<.001$ ).

There was an expected negative relationship between religiosity and creativity. Church density in 1952 moderately correlated with creative class ( $r=-.41$   $p<.001$ ) and weakly correlated with patents ( $r=-.21$   $p<.001$ ). Adherence weakly correlated with creative class ( $r=-.20$   $p<.001$ ) and even more weakly correlated with patents ( $r=-.08$   $p<.001$ ). Correlations with patents were weaker, possibly because patent rate is less comprehensive measure of creativity than creative class, though correlations still had the expected sign. However, given an enormous diversity of US counties, it is remarkable that even these correlations were present. The relationship of religiosity and creativity was further explored and visualized in bar charts.

Figure 1 shows gradient in bar charts of mean religiosity levels (X axis) by deciles of creativity (from 1="low" to 10="high"). There emerged a clear gradient. The most creative decile (10th) had fewest churches and adherents. Note the temporal precedence—adherents in 2000 affected patents over the next decade (2000-11) (panel d), and there was even a clearer pattern in the relationship of church density in 1950 and both creative class in 2000 (a) and patents in 2000-2011 (c); there was no temporal precedence in subfigure (b)—both variables were measured in 2000. The clearest gradient emerged in creativity (2000) against church density (1952) in panels (a) and (c). One explanation is that there was arguably a lag in the effect of the ecological factor (religiosity) on creativity—for instance religious upbringing and environment may hamper creativity of next generation. There were about twice as many churches per 1,000 people in 1950s in least creative decile of counties 95% CI= [2.6, 2.8] as compared to most creative decile [1.2, 1.4]. The relationship with adjusted adherence rate in panels (b) and (d) was little weaker—the gradient was less step and, interestingly, most religious counties were those almost least creative but not the very least creative—the least creative (first) decile was distinctively less religious than slightly more creative deciles. I do not have an explanation for this pattern. Results persisted, religiosity predicted less creativity, when controlled for other county characteristics—regression results are in the online appendix.

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Patents are arguably less comprehensive, but perhaps more precise, measure of creativity than creative class. Church density is probably both less comprehensive and precise measure of religiosity than adherence rate. Hence, in the following maps (figure 2), I focused on adherence and creative class. The two maps show quite opposite pictures confirming negative relationship between religiosity and creativity. Unsurprisingly, San Francisco Bay Area or Silicon Valley was

in top creativity tertile, and as hypothesized, it was in the bottom religiosity tertile. Likewise, whole Portland OR and Seattle WA metropolitan areas were in top tertile of creativity and bottom tertile of religiosity; in fact, the same relationship held for most of Eastern Oregon and Washington. In Texas, the metropolitan areas of Dallas, Austin, San Antonio and Houston were mostly in top tertile of creativity, and mostly either in 1st or 2nd tertile of religiosity. By contrast, North-Eastern Texas was very religious and uncreative. Much of Florida was irreligious and creative. Most of North East, however, exhibited a less-clear pattern; it was very creative but also moderately religious. Three large cities, Boston MA, New York NY and Philadelphia PA were all in top tertiles of creativity and religiosity, that is, there was a positive relationship between religiosity and creativity there. Arguably, religiosity in those areas was due to Irish and Italian immigrants, who tend to be religious. Furthermore, I speculate, if data allowed finer geographic representation, neighborhoods or census tracts that were most creative, would have been less religious. This exercise, however, remains for the future research. Given the space limitation, it is not possible to discuss all areas—to be sure, there were more outliers, but the overall relationship was negative as hypothesized.

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## General conclusion

Creativity is probably the single most important ingredient for broadly understood progress (technological, economic, social, academic, and so forth). It is striking that there are only two studies (Day 2005, Zysberg & Schenk 2013) investigating the link between religiosity and creativity. Religiosity is a powerful force shaping society, and hence, it should also impact in many ways creativity. This is the first study on the relationship between religiosity and creativity at county level. Results suggest that there is a weak to moderate negative relationship. Religious counties remained less creative, even controlling for education, income, political orientation, urban-rural continuum, and prevalent industry—regression results are shown in the supplemental online material.

Of course, as with any non-experimental data, causality cannot be argued. I speculate, however, that religiosity may cause lower creativity. There are theoretical reasons to expect it as elaborated above—religiosity promotes traditional, do-not-question orientation, while creativity is quite the opposite. On the other hand, causality may also go the other way round or there may be a third factor. For instance, creativity is closely related to success—creative types are successful by many measures: income, prestige etc. Unsuccessful/uncreative people may turn to religion for solace. It is a robust finding that religion buffers from misery (Koenig et al. 2001). It remains for the future research to tackle causality issue.

An important goal of this study is to spark more interest in religion among creativity researchers, and perhaps even spark some interest in creativity among scholars studying religion.

There is an amazing opportunity for further exploration using the data available at aggregate level, for instance, at county level, as done in this study. There is more rich religiosity data available from ARDA, and creativity can be proxied by other indicators, such as R&D employment and commercial value of patents. There is, however, an even more exciting opportunity to study the effect of religiosity on creativity at person level. And there are some good measures of creativity—for an overview see Silvia et al. (2012). However, an appropriate datasets need to be produced first. As of June 2014, it appears that a person level dataset containing both religiosity and creativity measures does not exist. Religiosity is well measured in large surveys, such as American General Social Survey (GSS) or cross-country World Values Survey (WVS), but there are no creativity measures there. Also, a person level investigation using GSS is possible—GSS lists occupations and one can assign creativity score for each occupation.

This study has focused on the overall religiosity, and leave the investigation of religious denominations for the future research—some religions may be more conducive for creativity than others. There are also different types of religiosity, for instance, social and individual religiosity (Okulicz-Kozaryn 2010). As there are different types of religiosity, there are also different types of creativity (e.g., Kaufman & Beghetto 2009)—measures used in this study reflect Big-C and Pro-c, but results might not necessarily extrapolate to mini-c or little-c.

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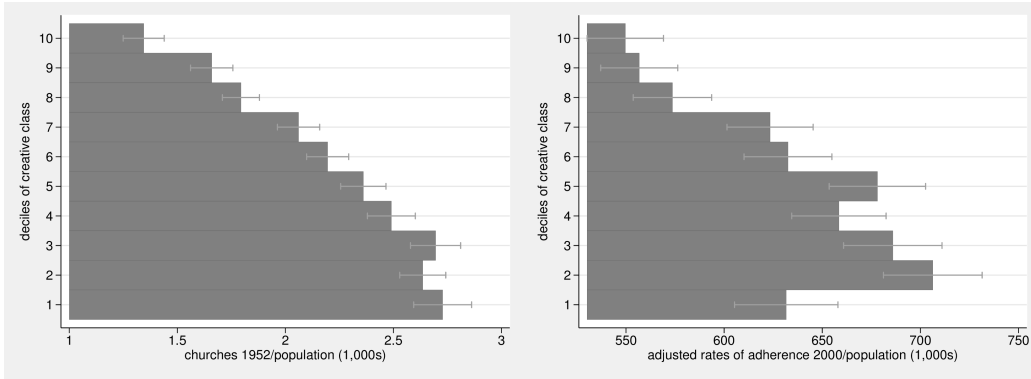
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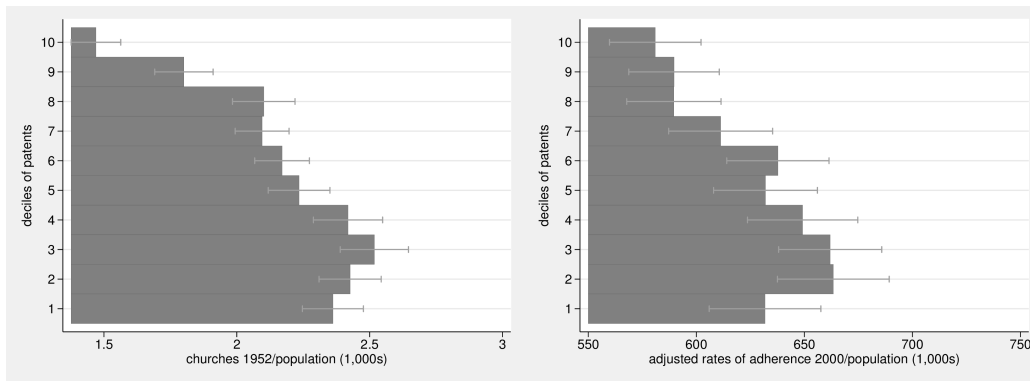
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(a)

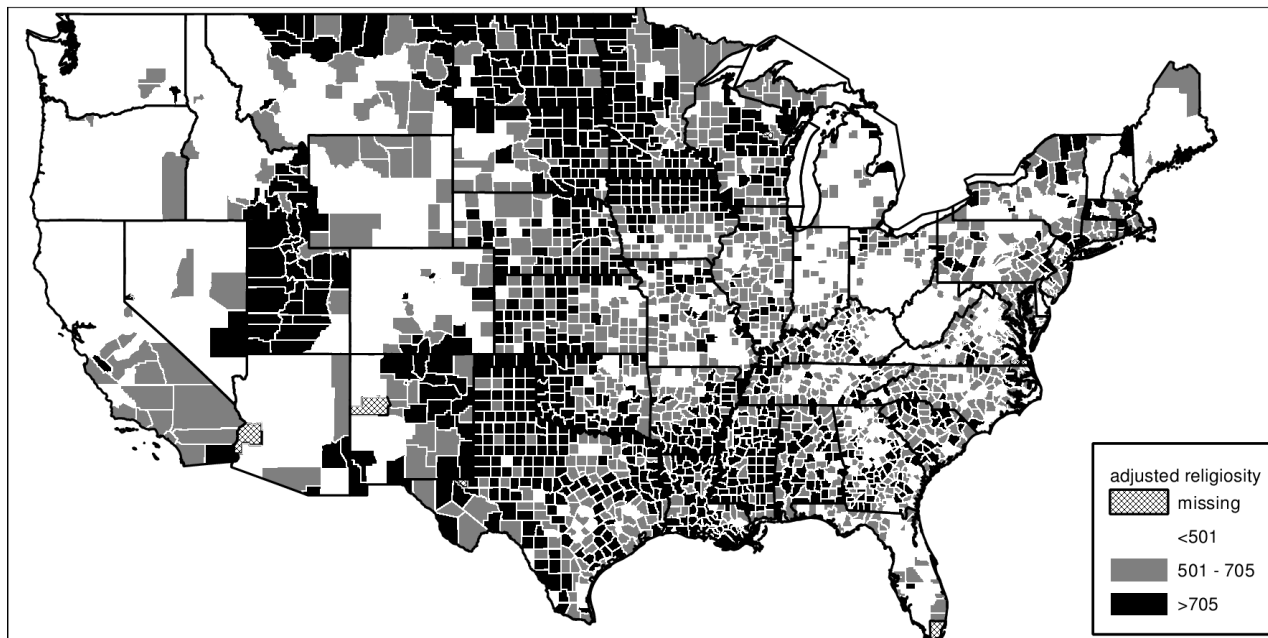
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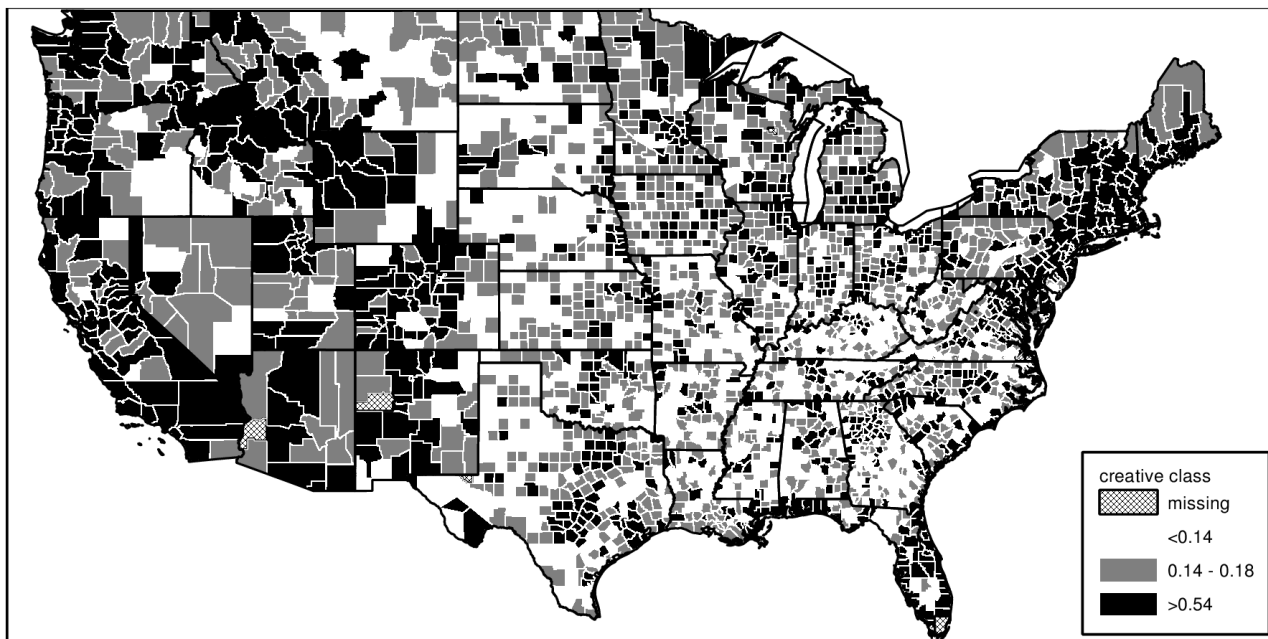
(c)

(d)

Figure 1: Mean religiosity levels by deciles of creativity from 1="low" to 10="high" measured as creative class (2000) in first row and patents (2000-11) in second row. 95% confidence intervals shown.



Adherents per 1000. Colors classified by tertiles (3 quantiles)—the darker the color, the more religious the area.



Proportion in creative class. Colors classified by tertiles (3 quantiles)—the darker the color, the more creative the area.

Figure 2: Thematic maps.