

Can the state accelerate the secular transition? Secularization in East and West Germany as a natural experiment

Jörg Stolz, Detlef Pollack, Nan Dirk De Graaf

Abstract

Germany was a divided country from 1949 until 1989. During this period, West Germany remained a rather religious country, while East Germany became, under socialist rule, one of the most secular regions in the world. We use this case of socialist state intervention as a natural experiment to test Voas' model of secular transition, which states that all Western and Central European countries follow the same path and speed of secularization. We employ ESS, GSS, and KMU surveys, as well as church statistics, to show that Voas' model holds for West Germany but not for the East. In East Germany, the state accelerated the secular transition substantially: through coercion, incentive structures and education, it succeeded in triggering mass disaffiliations from the church irrespective of age, and in discouraging parents from socializing their children religiously. This led to a self-perpetuating process that resulted in a rapid increase in the number of people who were never socialized religiously at all.

1. Introductionⁱ

In a bold, prize-winning article, Voas (2009) claimed that all Western and Central European countries pass through the same process of secular transition. According to Voas, these countries follow a common trajectory, one that starts with high levels of religiosity, followed by first a rise and then later a fall in "fuzzy fidelity", and ending in a secular situation.

Interestingly, according to the model, the form and speed of this secular transition is basically the same for all countries – the only element that differs is the moment at which a specific country enters the process of secular transition, which then takes approximately two centuries to complete.

The secular transition rests on the underlying mechanism of the self-perpetuating failure of intergenerational religious transmission (Voas, 2008). It has long been known to sociologists of religion that religious socialization in childhood is the most important predictor in post-industrial countries of an individual's religiosity in adulthood (Kelley and De Graaf, 1997, Stolz, 2009, Voas and Storm, 2012). The novelty of the Voas model, however, lies in its argument that the failure of the mechanism of religious transmission translates into a uniform shape for secular transition.

The Voas model has been corroborated quite spectacularly by a recent article showing that it applies not only to European countries, but also to the US (Brauer, 2018). Other publications had already shown that the US is not an exception to the secularization thesis (Voas and Chaves, 2016), but Brauer added that the US seems to follow *exactly the same secularization path* as European countries.

The Voas model is bound both to fascinate and to challenge the academic community. Do all these countries (and possibly also non-Western and non-Christian countries) indeed experience essentially the same secular transition in a similar form and at a similar speed, albeit at a different starting-point in time? Is it really true – as the model implies – that all other determinants of secularization cherished by sociologists of religion, such as state regulation, educational reforms, wars, and economic insecurity, do not have any (or only a

very small) influence on the form and speed of this secular transition (Immerzeel and Tubergen, 2013, Putnam and Campbell, 2010, Stark and Finke, 2000)? We cannot of course settle these questions once and for all – but we can make an important start with a very interesting test case.

This article discusses the Voas model of secular transition critically by focusing on what may be seen as a crucial natural experiment in religious history: East and West Germany between 1949 and 1989 (Froese and Pfaff, 2005). For 40 years, one part of the country was ruled by a Western-style government, while the other was subjected to Soviet-controlled socialist rule. As we will show, this difference had a vast impact on overall religiosity and secularism. Taking East and West Germany as a test case is particularly worthwhile since both Voas and Brauer include Germany in their models, and conclude that it fits the model very well – without, however, distinguishing between East and West Germany.

Our key questions are as follows. First, do both East and West Germany indeed fit the Voas model of secular transition – despite socialist rule in East Germany? And, second, what underlying mechanisms explain the huge differences in religiosity between East and West Germany?

We answer these questions in three steps. First, we replicate the Voas and Brauer model with the help of the European Social Survey (ESS) of 2002 and data from the General Social Survey (GSS) of 1989/2008, and show that East Germany does *not* fit the Voas model. Second, we use longitudinal church statistics going back as far as 1900, and demonstrate that the pressure on religion exerted by the East German regime after 1949 led to a combination of disaffiliations from the church and the ending of religious socialization for children.

Finally, we employ three waves of the *Kirchenmitgliedschaftsuntersuchung* (KMU) of the *Evangelische Kirche Deutschlands* (EKD) (1992, 2002, 2012), and show that the pressure exerted by the East German regime in the past actually worked through this mediator, i.e. the combination of church disaffiliation and the ending of religious socialization, to create aggregated differences in religiosity long after the reunification of West and East Germany.

2. Theories of secular transition and religious change

We can first distinguish between two theoretical perspectives that lead to different hypotheses as to whether we should expect differences in religiosity between East and West Germany, and how we should explain such differences.

The Voas model of secular transition

The first theoretical perspective – the Voas model – predicts that the division of Germany after the Second World War into a Western and an Eastern part should not have had any important effects on religiosity. The Voas model of secular transition (Voas, 2008) is a theory of self-perpetuating change: countries or regions are thought to enter a process of religious decline that then takes on a momentum of its own, with the countries all following the same trajectory, irrespective of any socio-historical contingencies.

Using European data from 2002, Voas divided the population of every European country into three groups: religious, fuzzy (i.e. only moderately religious), and secular. His key idea was that the process of secularization sees individuals (and their offspring) switching from religious to secular not immediately, but via an intermediate state of “fuzzy fidelity”. If we

assume a starting-point where everybody is religious, then it has to be the case that the group of the religious will give way to the group of those showing fuzzy fidelity, which will first grow and then decline, giving way eventually to a secular group. Drawing on Voas (2009) and Brauer (2018), we can summarize the explicit and implicit assumptions of the model as follows:

1. All countries follow the *same trajectory*. They transition at the same speed through the same relative percentages of religious, fuzzy, and secular.
2. The functional forms of the two trajectories of the religious and secular population are *logistic, S-shaped curves*. The fuzzy trajectory is the difference between the religious and the secular curve.
3. Countries differ solely in terms of the *point in time* at which they are on the assumed trajectory.
4. Countries or regions are *distinct populations with the same trajectory over time*.

Note that we are interested here in laying out the model in its bare essentials. It may very well be that certain assumptions have to be relaxed somewhat when applied empirically. Thus, Voas (2009) himself introduces a certain number of caveats, noting that the speed of the process does not always seem to be exactly the same (167), or that religion does not seem to disappear completely, but rather to level off (159-160). As we have seen, the Voas model assumes the same trajectory for all countries, and therefore does not anticipate that external shocks such as socialist rule will have an effect. That said, the Voas model could still fit the German case in two very different ways, leading us to formulate two hypotheses:

H1a There are no significant differences in religiosity between East and West Germany.

The trajectories of both East and West Germany fit the Voas model for the *same* point in time.

However, even a superficial knowledge of Germany suggests that H1a will be difficult to uphold. We include it simply because Voas and Brauer actually make this implicit assumption. Another way of approaching the question would be to claim that East and West Germany should be seen as two different countries, with each finding itself at different points on the time axis. In that case, we would have to check the fit of both countries to the overall model at the different points in time. This leads to H1b:

H1b East Germany shows significantly less religiosity than West Germany. The Voas model fits both East and West Germany if it treats each as a different country (i.e. at *different* points in time (see assumptions 3 and 4 above) on the path of secular transition).

State coercion, disaffiliation from the church, and failure of religious transmission

The alternative theoretical perspective that we adopt in this paper argues that the division of Germany after the Second World War may be deemed a unique natural experiment, with socialist rule in East Germany having important causal effects on religiosity. In this view, anti-religious state coercion in East Germany led people to disaffiliate from the church and to cease socializing their children religiously. This in turn had a self-perpetuating effect in that children who had received no (or hardly any) religious socialization transmitted even less religion to their children when they themselves became parents (i.e. even in the absence of state coercion). The incentive structure of the state was so strong from the very beginning

that even religious parents were willing to give up their religion because doing so was in the best interests of their children.

Several papers have studied how religiosity was influenced differently in West and East Germany over time. Froese and Pfaff (2005), as well as Pollack and Rosta (2017), have provided a historical and statistical account of the effect of socialist rule on religiosity in East Germany. Lois (2011a) uses repeated cross-sectional surveys (ALLBUS) and presents an Age-Period-Cohort analysis of the likelihood of church membership and of the frequency of attendance at church service from 1980 to 2008 (West Germany), and from 1991 to 2008 (East Germany). Lois (2011b) uses the German Socio-Economic Panel and fixed effects regression models to study the contrasting development of religiosity in East and West Germany from 1992 until 2007, focusing in particular on the question of whether there was a revitalization of religion in East Germany after the *Wende*. Hardy et al. (2019) use an APC analysis to understand how the proportion of “nones” grew in West and East Germany after 1949. Our analysis has a somewhat different focus, however, since it tests whether East Germany fits the Voas model, and it uses a mediation analysis to study the extent to which differences in religiosity after the *Wende* can be attributed to state coercion during the socialist era.

To place the natural experiment within its historical context, we should recall that, after losing the Second World War, Germany was divided into four occupation zones, controlled by France, Britain, the US, and the Soviet Union. While the first three united their zones in the West, creating the Federal Republic of Germany (FRG) in 1949, the Soviet Union created in the same year a separate, socialist German state in the East, the German Democratic Republic (GDR) (Richter, 2009: 11 ff.).

Overall, the West German state (FRG) had a positive relationship with religion, and saw the main churches (which had been among the very few institutions to show at least some resistance to Nazism) as valuable institutions for societal integration. For this reason, freedom of religion was guaranteed by the constitution, but the churches were not completely separated from the state and enjoyed important privileges, the most important being the opportunity to levy a church tax. While there were minor differences between the federal states, churches were also allowed to provide religious education in state schools. Until 1989, it was only Christian groups that were recognized as corporations under public law. Furthermore, the Catholic and Protestant churches engaged in various forms of religious socialization, the most important being classes for confirmation. According to the census of 1950, 51.2% of the population were Protestant, 45.2%, Catholic, and 3.7%, without a religion (Schmitt, 1989: 55). By 1990, this had changed to 39.5% Protestant, 43.0% Catholic, and between 11 and 12% without a religion (Pollack and Rosta, 2017: 76, 294).

In contrast, the East German state (GDR) imposed strong restrictions on religion. While the constitutions of 1949 and 1968 paid lip service to freedom of religion, the GDR did in fact impose many restrictions on, and discriminate against, individuals and groups who opted for a religious lifestyle. Generally speaking, the ruling party saw the churches as its ideological enemy and worked towards subjugating them completely. According to corrected census and survey data from 1950, 80.5% of the population in East Germany were Protestant, 11.0%, Catholic, and 7.6%, without a religion. By 1990, this had changed to 24.0% Protestant, 4.6% Catholic, and 69.3% without a religion (Pollack, 1994: 374).

Our argument focuses on two points. First, socialistⁱⁱ rule caused people to *disaffiliate* from the churches. The state had a number of methods to force people to disaffiliate from the church, including (a) imposing administrative obstacles on church activities, (b) spreading ideological propaganda that accused church officials of being imperialist agents and that ridiculed people who still believed, and (c) exerting pressure on Christians by obstructing or threatening to obstruct their professional career or the education of their children. This was a strong incentive for people, irrespective of age, to become secular, and led to a significant decline in churchgoing and to a significant rise in the number of people leaving the church in the 1950s (Pollack, 1994: 139, 383).

Second, socialist rule caused schools, and especially parents, to *cease socializing children religiously*. From 1946, religious education was gradually withdrawn from state schools (Hueck, 2000). It lost its status as a “full subject” in 1946, and, although religious education was still guaranteed by the constitution, churches were increasingly harassed and prevented from trying to organize such teaching. As a consequence, the churches increasingly abandoned religious education in state schools, and set out to organize *Christenlehre* (Christian teaching) on their own premises instead.

At the same time, the GDR introduced a powerful set of secular alternatives designed to push the churches and religious education out of children’s lives. One secular alternative was that all school education was imbued by socialist ideology in the GDR. Schooling took place in the morning, and official school activities were then followed by activities run by the Ernst Thälmann Pioneer Organization (for children aged 6 to 14), and by the *Freie Deutsche Jugend* (FDJ) (for children aged 14 and above). The former was a scout-like organization where children would play, do outdoor activities, and be subjected to socialist teaching

(Kaiser, 2013). Officially, membership of the Pioneer Organization was voluntary, but those who did not join faced exclusion and ridicule. It is important to understand that the regime managed to hold children and young adults in its ideological and anti-religious structures for many of their waking hours.

Another secular alternative was the *Jugendweihe* (secular coming-of-age ceremony) (Döhnert, 2000), a secularist alternative to church confirmation that the party institutionalized in 1954. The new ritual only had limited success initially. But, when the state exerted a great deal of pressure in schools, at work, and in leisure organizations in 1958, the dam broke and the proportion of the cohort of children at that time choosing the *Jugendweihe* reached more than 90% (Döhnert, 2000: 133). Children celebrated the *Jugendweihe* at exactly the same age (14) and at the same time of year (around Easter) as the Protestant confirmation, and they had to undergo a year of instruction beforehand. Family members were invited to the ceremony, which took place in a public building, and the young person had to pledge her allegiance to the state and the party, and was given a book as a present. The ritual turned the young person into an “adult”, someone who was then addressed with the formal pronoun *Sie* and was often allowed to drink her first glass of alcohol. These rituals were introduced to help create a new and attractive belief, i.e. a belief in progress and humanistic socialism. Although the *Jugendweihe* was in theory voluntary, the party strongly disapproved of those not celebrating in this way, with “defectors” being singled out in public, ridiculed, and often prevented from enrolling at an institution of higher education (Döhnert, 2000: 129).

All these measures show that the socialist state introduced a repressive structure that gave people an incentive to behave in a particular way, and that imposed penalties on those who did not comply. Importantly, parents also had a strong incentive not to sacrifice their

children's chances in life by continuing to socialize them religiously. It therefore became apparent very quickly in the 1950s that the great majority of people were not prepared to maintain their church ties. Many left the church, and most stopped socializing their children religiously. This began a self-perpetuating cycle in which intergenerational religious transmission did not occur. We can condense all of this in a hypothesis that in principle predicts a strong period effect (a substantial number of people leaving the church, irrespective of age), which ultimately becomes a cohort effect, since hardly any members of the younger cohort were socialized religiously:

H2 Socialist rule led to a lower level of religiosity in East Germany. This was achieved by

 (a) forcing people to disaffiliate from the church, and (b) weakening religious socialization.

In summary, this second hypothesis suggests that socialist rule made East Germany a case that cannot possibly follow the Voas model of slow secular transition. This is what we will now test.

3. Methodology

Data and measures of the replication of the Voas model

The ESS is a multi-year, cross-national survey of European countries (42,359 cases for 22 countries) that measures attitudes, beliefs, and behaviour.ⁱⁱⁱ The 2002 ESS includes 1,821 cases for West Germany and 1,089 cases for East Germany. The GSS is a multi-year, nationally representative survey of the US population.

We use these data so that we can replicate exactly the results produced by Voas and Brauer, the difference being that we compare the fit of East and West Germany *separately*.

The dependent variable is the ordinal measure of being religious, fuzzy, or secular. Following Voas/Brauer's coding, we code individuals as "*religious*" if: (1) they score 7 or higher on a scale from "Not religious at all" to "Very religious" (scale ranging from 1 – 11), and (2) if one of the following two criteria is given: they score the importance of religion to their lives as 7 or higher on a scale from "Extremely unimportant" to "Extremely important" (scale ranging from 1 – 11) or they attend a religious service at least once a month. Individuals are coded as "*secular*" if they show all of the following four attributes: (1) they have a religiosity score of 3 or less; (2) they say that they attend a religious service "only on special holy days or less often"; (3) they score the importance of religion to their lives as 3 or less; (4) they say that they pray "only on special holy days or less often". The remaining respondents are classified as "*fuzzy*". We distinguish individuals as living either in West Germany (*alte Bundesländer*) or East Germany (*neue Bundesländer*). People living in Berlin are classified as living either in the former West Berlin or East Berlin.

The two main independent variables are:

- *Year of birth* of each respondent (centered).
- *Country*. Every country is represented by a dummy variable. The US is the reference category.

To ensure comparability, we added the following controls, just as in the model used by Brauer (2018: 7).

- *Sex*. A dummy variable using male as the reference category.
- *Ethnic minority status*. Non-white respondents are categorized in the GSS as ethnic minorities.
- *Years of education*.
- *Size of the area of residence*, where 1 corresponds to a medium-to-large city or unincorporated area, 2 corresponds to a suburb, 3 corresponds to a small town, 4 corresponds to a country village or area comprising between 1,000 and 2,499 people, and 5 corresponds to the open countryside.

We use listwise deletion to deal with missing data, and weight ESS and GSS observations using DWEIGHT and WTSSALL variables respectively.

We use ordinal logistic regression models to estimate the secular transition model for West and East Germany (Brauer, 2018: 8). We replicate Brauer’s “strict model”: the dependent variable captures whether respondents are religious, fuzzy, or secular, and the only independent variables are a rescaled year-of-birth measure and dummy variables for country (with the US acting as the reference category). This model is used to predict each country’s progression on the path of secular transition. A second model (the “control model”) includes the additional explanatory variables of sex, urban/rural, religion, ethnic minority, and education. We estimate the two models separately for the two assumptions that (1) the two parts of Germany should be seen as one country that went through the secular transition at the same points in time; (2) the two parts of Germany should be seen as two countries that began the secular transition at different points in time. We estimate the substantive and non-statistical “fit” for both East and West Germany under both conditions according to the method used by Brauer (2018: 9). We calculated the models with R

(Version 3.5.2).

Longitudinal data and measures describing disaffiliations and the cessation of religious socialization in East and West Germany

Here, we use church statistics from the Protestant and Catholic churches in East and West Germany from 1949 to 1989, collected by Pollack (1994) and recently updated by Pollack and Krueggeler (2016). Specifically, we use

- (1) the rate of church disaffiliation = the number of disaffiliations, divided by the number of Protestants and Catholics;
- (2) the rate of baptism = the number of Protestant and Catholic baptisms in a year, divided by the total number of births in the population;
- (3) the rate of confirmation or *Jugendweihe* = the number of young people celebrating confirmation/*Jugendweihe* at the age of 14, divided by the number of 14-year-olds in a given year.

Data and measures for the mediation analysis of religiosity in East and West Germany

To explain East-West differences in terms of religiosity, we use:

- (2) Three waves of the *Kirchenmitgliedschaftsuntersuchung* (KMU) provided by the *Evangelische Kirche Deutschlands* (EKD): 1992, 2002, and 2012.^{iv} The KMU is a survey conducted every ten years among members of the Protestant church and individuals without a religion in Germany. We use weighted data.^v The dataset includes N = 8,297 individuals

(5,999 West, 2,298 East). To prevent possible selection effects, we excluded individuals who were now living in East or West Germany, but who had grown up in the other part of Germany. Note that non-Protestant religious affiliations are excluded. Since our focus is the comparison of West and East Germany, and since East Germany was historically essentially Protestant, this means that our data already “control for” religion.

In our regression analyses with the KMU data, we use two dependent variables. The first is *strength of belief in God*. In 1992 and 2002, this variable had the levels “I believe that there is a God who made himself known in Jesus Christ”; “I believe in God, even though I often doubt and become uncertain”; “I believe in a higher power, but not in the God that the church describes”; “I believe neither in a God, nor in a higher power”; “I am certain that there is no God”. In 2012, this item was slightly changed to the levels “I believe that there is a God who made himself known in Jesus Christ”; “I believe that there is some higher being or a spiritual power”; “I do not really know what to believe”; “I do not believe that there is a God, a higher being, or a spiritual power”. We harmonized the scales in 1992 and 2002 thus: 1 and 2 = 3, 3 = 2, 4 and 5 = 1; and in 2012 thus: 1 = 3, 2 and 3 = 2, 4 = 1, and labelling the new levels as (1) “No belief in God”, (2) “Fuzzy belief in God”, and (3) “Certain belief in God”.

Our two dependent variables both measure the latent construct “religiosity”. They correlate with $r = .668$. We use two indicators of religiosity to show the robustness of our findings.

The second dependent variable is *frequency of attendance at religious service*, which is measured with a five-step variable distinguishing 1 “never”, 2 “only at family gatherings”, 3 “several times a year”, 4 “1-3 times a month”, 5 “once a week or more”.

Our independent variable is whether respondents have been brought up and live in *East or West Germany*.

Our central *mediator* is religious belonging and distinguishes people who are Protestant, who have disaffiliated from the church, or who have never had a religion (who have never been socialized religiously, e.g. baptized or confirmed). While the distinction between those who have disaffiliated and those who have never had a religion is descriptively highly interesting, we have collapsed the variable for our regressions into a dichotomous variable: Protestant (0) vs. no religion (1).

We also use the following controls:

- *Unemployment*. Measures whether the respondent is unemployed at the time of the survey (1) or not (0). This control is used because unemployment is related to strain, which, according to some scholars, may lead to a higher level of religiosity (Immerzeel and Tubergen, 2013).
- *Living with a partner*. Measures whether the respondent lives (married or unmarried) with a partner at the time of the survey (1) or not (0).
- *Educational level*. Measures the highest level of education attained by the respondent. We use four dummies with levels “In education”, “Hauptschule” (lower level), “Realschule/POS” (intermediate level), “Gymnasium” (higher level). The reference level is “Other”. Hardy et al. (2019) have recently highlighted the link between education and religiosity in their analysis of religiosity in East and West Germany.

We controlled for year of birth (capturing a possible cohort effect), and age squared (capturing a possible life-cycle effect). We furthermore controlled for sex, and urban-rural. Missings were imputed in independent variables; we used weighted data (jweight).

We used R (Version 3.5.2) to estimate our models. The Voas model was fitted with the R package Ordinal (function `clm`). The ordinal regressions were estimated with the R package VGAM (function `vglm`).

Table 1 gives descriptive information (percentages, means, standard deviation) on our dependent variables, our mediator, our independent variable, and our controls, used in the OLS and ordinal regressions in the third part of our results. Note the much lower level of religiosity in East than West Germany (belief in God, attendance at religious service), and the much higher percentage of individuals who have disaffiliated (26.7%) or never had a religion (47.6%) in East Germany than in West Germany (17.3% disaffiliated, 6.1% never having had a religion).

Table 1 about here

Assessing the “natural experiment”

Our argument hinges on the fact that East and West Germany can be seen as a “natural experiment”, with East Germany being subjected to the “treatment” of socialist rule.

As in a randomized control trial, we would like to attribute the effect in our dependent variable to intervention by the socialist state. This seems justified in many respects. In fact, East and West Germany had previously been relatively similar economically, politically, and culturally, and individuals did not choose the type of “treatment” to which they were then subjected. In fact, they often wanted to choose their own “treatment”, but were prevented from doing so by various legal barriers and then (from 1961) by the Berlin Wall.

We should note three important caveats, however. First, East Germany is by tradition predominantly Protestant, which is not the case for West Germany (Pollack and Rosta, 2017: 73ff.). If we did not control for confession, then differences in religiosity might be due not to the type of rule but to confessional differences. In our regressions below, we will therefore only compare Protestants and people without a religion in East and West Germany.

Second, some indicators (number of communions, frequency of church attendance, number of baptisms) show that East Germany was slightly less religious than West Germany even before the division of the country in 1949, and even when we control for confession (McLeod, 2004: 180). The historical reason for this seems to be that anti-religious social democracy had been especially strong in East German regions since the end of the 19th century. As we will show below, however, these differences are marginal in comparison to the East-West differences in religiosity that can be observed during the 1950s and up to the present day.

Third, East-West differences in religiosity may also have been caused to a certain extent by emigration from the East to the West between 1949 and 1961. In this period, a total of 3.4 million people emigrated from the GDR, mostly to the FRG (Effner and Heidemeyer, 2005: 27f.). Thus, if these people were more likely to have been religious than those who stayed (which, given the anti-religious policies of the regime, seems plausible), then our results may be biased. While there are unfortunately no data to verify this, we can calculate the maximum effect that this emigration may have had on religious belonging in East Germany between 1949 and 1961. If the only people who emigrated between 1949 and 1961 were those who had a religion (while everybody who had no religion decided to stay), this would increase the

percentage of people without a religion in the GDR *ceteris paribus* by 1.7% (see Appendix, part 1). In actual fact, though, the number of people without a religion grew during that period by 17.6%. Thus, for religious belonging at least, the possible bias caused by emigration is negligible.

4. Results

Fitting the Voas model to West and East Germany

Our first key question is whether the Voas model of secular transition fits both West and East Germany. This question can be answered easily by inspecting the figures that we have created. Figure 1 plots the percentages of religious, fuzzy, and secular individuals according to “theoretical year born”, as modelled by Voas and Brauer for all European countries in their model.

Figure 1 about here

As stated at the beginning of this paper, the only element that differs between countries is the moment at which a specific country enters the process of secular transition. The overall process of transition then takes (according to our model, once all countries have been fitted) roughly two centuries to complete. For example, the eight cohorts from Greece, which is a very religious country, are located to the left of the figure, while the eight cohorts from the Czech Republic, a very secular country, can be found to the very right of the figure. The enlarged points show cohorts for West Germany. As we can see, West Germany fits the model very well, except for the oldest generation, which shows too many religious and not enough fuzzy people.

An intuitive understanding of how the model fitting works can be obtained by considering the following (see also Appendix, part 2). The figure is based on an ordinal regression with the dependent variable capturing the percentage of religious/fuzzy/secular for every country cohort, and the independent variables capturing birth year of individual (i) in country (j), and country.^{vi} The model estimates one coefficient for birth year and as many country coefficients as there are countries (minus 1, the reference country). Since the Voas model assumes that there can only be a single set of religious, fuzzy, and secular trajectories for all countries, each country's set of year-of-birth values has to be adjusted linearly (i.e. without stretching any country's data); in other words, they have to be "shifted to the left" or "shifted to the right", with respect to a fixed reference country. In practice, we transform the country coefficients linearly by dividing them through the birth year coefficient (a slope), thus giving us the number of years that every country has to be shifted. This creates a period of transformation of roughly 200 years. The common reference point is an arbitrarily chosen country, which in our case is the US.

Figure 2 is exactly the same, but the enlarged points now show East Germany. Here, we assume that East Germany finds itself at exactly the same point in time on the path of secular transition as West Germany (the "control group"), when only West Germany is fitted to the model. We have created this figure by fitting all countries, including West Germany, and then giving East Germany the same "shifter" with respect to our reference country (US) as West Germany. What is clear, however, is that East Germany does not fit the model at all: individuals are much too secular and not fuzzy or religious enough (there is a decrease instead of the expected increase). The data show a jump between the third and the fourth generation: the fourth generation (1945-1954), the first to have been socialized in the GDR, seems to be especially secular and less fuzzy in comparison to the third generation. However,

if we inspect the different indicators of religiosity one by one, then this jump becomes much less pronounced, and we therefore do not emphasize it too much. What is more important to note is that all generations, even those not socialized in the GDR, were strongly pushed into a secular direction, leading to a very bad fit for the model. This can also be shown numerically.

Figure 2 about here

The substantive fit index proposed by Brauer lies at .679. That is, the model correctly classifies on average 67.9% of respondents as either religious, fuzzy, or secular. This is by far the worst fit of any country. For example, the index for West Germany is .909, and for the US it is .921 (see Appendix, part 3).

We might try to defend the model by arguing that West and East Germany should be seen not as the same country (in religious terms), but as two different countries that may each be at different points in time on the path of secular transition. We have run the model accordingly (see Appendix, part 4), and indeed East Germany is fitted as being the most secular country of all: the fit is now much better at .933. There are two major problems with this, however. First, the shape of the curves is clearly not in line with the predicted curves, especially for secular and fuzzy groups. Second, and more importantly, we now assume that East Germany started much earlier than West Germany on the path of secularization, and has in the last two centuries undergone the slow process depicted by the model. This, however, is simply not what has happened, as we will demonstrate below.

Describing disaffiliations and religious socialization in West and East Germany

Having shown that socialist rule had a strongly secularizing effect on religiosity in East Germany, we can now test our second hypothesis, which is concerned with the mechanism through which this effect was achieved. The hypothesis claims that state intervention in the GDR had an important effect on people, making them more likely than people in the West to disaffiliate from the church and to cease socializing their children religiously. This should have had a self-perpetuating effect, since there is a high likelihood that children not socialized religiously will not believe, not practise, and will not socialize their own children religiously.

Both longitudinal and retrospective data clearly show that socialist rule did in fact have a tremendous effect on religion in East Germany, especially in the 1950s.

Figure 3 shows the rates of disaffiliation in Germany since 1900. We can see that these rates were extremely similar in East and West Germany before 1945 (we recreated an East-West distinction for pre-1945 Germany on the basis of the subsequent borders). With the beginning of the natural experiment, though, the rates of disaffiliation immediately began to differ dramatically. They were substantially higher in East than in West Germany in the 1950s and 1960s, when state coercion in East Germany was at its peak. We can also see a peak in church disaffiliations at the end of the 1950s, when the state attack on religion was especially strong. Given how strong the regime's pressure on religion actually was, we might even wonder why there were not even more disaffiliations. But we have to consider here that the churches were not strong enough to enforce their membership rules (such as church tax), which meant that people could have disaffiliated subjectively from the church and not have had any contact with it, while still continuing to figure as members on the church files. In

fact, retrospective data show slightly higher rates of disaffiliation (see the Appendix, part 5).

We note in passing that church disaffiliations reached their peak in East Germany immediately after the downfall of the GDR, when people left the church mainly for financial reasons (i.e. to avoid paying church tax) (Pollack and Rosta, 2017: 83).

Figure 3 about here

More important than disaffiliations were the effects of socialist rule on the religious socialization of children. Figure 4 shows that the percentage of the birth cohorts who were baptized were relatively stable and above 80% in both West and East Germany until 1950. They then fell in East Germany from 85.8% in 1950 to 28.3% in 1970! This can be compared to the relatively slow decline in rates of baptism in West Germany. Again, we note in passing a slight upswing in the number of baptisms in East Germany after the fall of the GDR. However, this upswing was only temporary and could not compensate for the losses. Similarly, dramatic changes can be observed when looking at how the East German regime tried to replace religious confirmation with the secularist *Jugendweihe*. While rates of confirmation in East Germany were around 80% at the beginning of the 1950s, they dropped to 33.2% in the single year of 1958, when the government cracked down especially hard on religion, only to fall further in subsequent years. At the same time, the secularist *Jugendweihe* rose from less than 1% in 1953 to 74% in 1958, and reached 99% in 1960 (see Appendix, part 6).

Figure 4 about here

The fact that the East German regime was effectively able to stop the religious socialization of children had a devastating effect on religion: it meant that the process became self-reinforcing, since generations that had not been religiously socialized did not (and, indeed, could not) transmit religious belonging and religiosity to their own offspring. It is therefore no wonder that the percentage of East Germans who claimed to be “none” in 1992 because they had “never had a religion” was 0% among those born in 1940-50, 31.6% among those born in 1941-50, and 77.4% among those born in 1960-70 (see Appendix, part 7).

Explaining differences in religiosity in West and East Germany – a mediation analysis

We will now show that the results presented so far hold up from a multivariate perspective. We have modelled both attendance at religious service and belief in God in the three waves (1992, 2002, 2012), using both OLS and ordinal logistic regression. The results are on the whole very similar. We therefore decided to present an OLS regression for the five-step dependent variable of attendance at religious service (Table 2), since the output is easier to interpret (for the ordinal logistic model, see the Appendix, part 8). For the three-step variable of belief in God, we present the ordinal logistic regression (Table 3). Our overall strategy is to show that these differences are the result of our hypothesized mediating variable, which is “none”. The main effect of the East-West dummy variable on belief and church attendance should therefore disappear or be strongly reduced when we control for our central mediator, and even when we control for various other possible confounding variables.

Let us first inspect Table 2. Model 1 enters only the dichotomy West/East Germany. We find an unstandardized regression coefficient of 0.84. As expected, attendance at religious service is much higher in West than in East Germany. A person in West Germany is on average 0.84

points higher on the five-point scale of attendance than a person in East Germany. It is this effect that we will try to interpret with our mediator.

Model 2 enters two dummy variables for wave 2002 and wave 2012 respectively (wave 1992 being the reference category) as controls. The waves have a slight negative, but not significant influence on service attendance; their introduction leaves the effect of our variable West/East virtually unchanged.

Model 3 enters the variables of year of birth and age squared as a control. Overall, the control variable of year of birth has a negative effect on attendance at religious service, but the coefficient for the variable of age squared is positive, indicating a convex, curvilinear relationship. Thus, the youngest individuals show a slight upturn in attendance. Introducing these controls only very slightly reduces the effect of West/East.

Model 4 enters further controls: gender, education, unemployed, live with partner, and urban-rural. As expected, we see that women attend religious service more often, but this gender gap is present both in East and West Germany, and can therefore not explain differences *between* East and West (see Hardy et al. (2019)). The effects of education are mostly not significant, unemployment lowers the probability of service attendance, living with a partner raises it, just as living in an urban context lowers it. Introducing these controls brings the effect of West/East back up to 0.83. This model explains 16.8% of the variance.

Model 5 enters our mediator “none”. Individuals who score 1 on this dichotomous variable have either disaffiliated from the church or never had a religion. Introducing the mediator makes the coefficient for West/East drop to only 0.07. The variance explained by the model

is more than doubled. Calculating the indirect effect of West/East on service attendance via the mediator “none”, gives us an effect of .77. This means that more than 90% of the effect of West/East on attendance “works” through the mechanisms we have identified.^{vii} Thus, attendance at religious service is much lower in the East than in the West because many more respondents are “nones”: they have either disaffiliated from the church or have never been socialized religiously. This finding is central to our argument, because it means that the East German state was able in a very short time to force people to disaffiliate from the church and/or to make parents and institutions cease religious socialization. This produced generations that did not retain their religiosity privately, and that relinquished their religion completely. One surprising finding is that the influence of the waves that had been negative (although not significant) in model 2 is significant and positive in model 5. This is a (mild) form of Simpson’s Paradox. Very simply put, the inversion happens because we control for two variables (birthyear and none) that are both positively related to wave and negatively to our dependent religiosity variables. We analyse how this reversal of coefficients comes about in the Appendix (part 9). That having been said, the inversion does not affect the general finding of our mediation analysis.

Table 2 about here

Table 3 shows the same analysis for the dependent variable of belief in God. Given that this variable only has three levels, we opted for an ordinal logistic regression. While the output may be slightly more difficult to interpret, the overall findings are very similar to the previous OLS analysis of attendance at religious service. Since the proportional odds assumption was not met, we estimated two different coefficients for the transitions between

the categories of the dependent variable. The lower coefficient is used to calculate the probability of being in the “religious” category, the upper coefficient is used to calculate the probability to be in the “fuzzy” category. To prevent Hauck-Donner problems of estimation, we constrained the coefficients of our mediator (none/Protestant) and of education to be parallel (hence, there is only one coefficient for the mediator “none” and for every education dummy). Technically, this makes our model a partial proportional odds model (a sub-form of the generalized ordered logit model) (Williams, 2016). To understand how these coefficients are to be interpreted, consider an example. In Model 1, we find for the West-East variable the two coefficients 1.95 and 1.52. These are logits (= log odds of the probability). To calculate the estimated percentage of being in the category of “religious” belief for somebody in the West, we would use the lower intercept coefficient and the lower West-East coefficient, and plug them into the function in the following way: $\text{logit}[P(Y \geq 2)] = (-1.39 - (-1.52 * 1)) = -0.13$. Now we take the inverse logit $\exp(x)/(1+\exp(x))$ of this value and obtain 53.2%. The probability that the same person is in the “fuzzy” category can then be calculated as the difference between the inverse logit of $(-0.27 - (-1.95 * 1)) = 84.2\%$ and the probability of being religious that we have just calculated (= 53.2%). This difference results in a figure of 31.0%. The probability of being in the category of “secular” belief is then the remaining 15.4%.

While this may look somewhat complicated at first, the overall message of Table 3 is similar to that of Table 2. Again, we find that respondents in the East are much less likely to believe in God than those in the West. Again, wave has initially no significant influence on the dependent variable, but in successive models, controlling for year of birth and none, we find a significant positive effect. In general, introducing the controls in models 2,3, and 4 does not much change the coefficient for West/East. However, as before, introducing our mediator

“none” greatly diminishes the difference (although it does not make it disappear). Looking at the pseudo r-squared coefficients, we can see that introducing the mediator raises the Nagelkerke coefficient from 0.270 to 0.496. Calculating the extent to which the mediator explains the overall effect, we find 91.9%.^{viii}

The fact that the same result is obtained with both our dependent variables of attendance at religious service and belief in God shows the robustness of our results.

Table 3 about here

Validity issues and checks

Mediation analyses are subject to various kinds of bias in the case of unobserved confounders (Richiardi et al., 2013). We tried to control for such confounders in our analyses, but cannot exclude the possibility that other, unobserved confounders still exist. One possible confounder is church affiliation or reaffiliation by the unchurched, which is not measured in our dataset. For example, if there was a significant number of new affiliations or reaffiliations to the church immediately after periods of state coercion, then our mediator would not correctly measure the number of disaffiliations that had occurred beforehand. There are reliable data to show that such affiliations or reaffiliations were extremely rare during the 40 years of the GDR, however (Pollack and Rosta, 2017: 241). Furthermore, we inspected the robustness of our findings by redoing the analysis under various conditions (see Appendix, part 10). We find in all these analyses very similar results as those presented here, which leads us to conclude that our results are robust.

5. Conclusion

In this paper, we have used the German case as a natural experiment to test Voas' model of secular transition and to explain differences in religiosity between East and West Germany.

The contribution of the paper is twofold. First, we have shown that the Voas model fits the case of West but not of East Germany. This is true whether we treat both parts of Germany as the same country, or whether we treat East Germany as a different country that precedes West Germany by several decades on the time axis. While West Germany fits the model predictions of declining religiosity almost perfectly, socialist rule in East Germany led to accelerating secularization and the simultaneous decline of both religiosity *and* fuzzy fidelity. This finding is important because it shows that the secular transition was at least in this case undeniably and strongly influenced by external factors, which undermines the idea in Voas' model of a smooth and gradual process. In the Voas model, secularization is largely due to a cohort effect, since the only people affected are children and teenagers, who then take their religiosity with them through time. In the East German case, however, state repression in the 1950 and 1960s had an effect on both children and adults, and can therefore be seen as a period effect with lasting consequences. This also means that, contrary to the Voas model, East Germany did not simply undergo a strong accelerated version of secular transition, but followed a different path. According to the Voas model, individuals do not change; rather, children are to a certain extent likely to be in a more secular group than their parents. It must have been the case in East Germany, however, that many *individuals* changed, and that they changed – irrespective of age – from being religious to secular without staying in the fuzzy zone. Only this can explain the dramatic changes presented above.

It is important to note at the same time, though, that our findings do not falsify Voas' model of secular transition. It may still be the case that western and central European countries follow the predictions of the model *in general* – and that our research is a deviant case study that clarifies where the boundaries of the model lie. On the other hand, future research may reveal more cases that do not fit the model, thereby leading us ultimately to rethinking the model itself.

Our second contribution is that, in building on and extending previous accounts of the East German case (Froese and Pfaff, 2005, Hardy, Skirbekk and Stonawski, 2019, Lois, 2011a, Lois, 2011b), we have advanced our understanding of the mechanisms that led to the astonishingly rapid process of secularization in East Germany. Age-Period-Cohort analyses produced mixed results when it comes to the question of whether state ideology in the GDR had important effects on the population's religiosity. While Lois (2011a: 178) finds no evidence that GDR cohorts were significantly different from pre-GDR cohorts, Hardy et al. (2019) find the opposite, and our analysis supports the latter's point of view. State socialism had an extremely important effect – and its effect was different for pre-GDR and GDR cohorts. Many individuals in pre-GDR cohorts had been socialized religiously, but, when faced with state coercion, they then disaffiliated from the church and embraced a non-religious worldview; in contrast, GDR cohorts received for the most part no or very little religious socialization.

Interestingly, while the Voas model does not seem to fit in its strict form, there is much evidence to suggest that the *underlying mechanisms* that it purports, including religious socialization and self-perpetuating secularity, are also important for the case of East Germany. It was primarily a failure of intergenerational religious transmission that led to

secularization in both parts of the country. But while this was a non-intended by-product of modernizing factors in West Germany, it was the result of the state's immense success in restricting religious socialization in East Germany. The secular transition model rests on the idea of a self-perpetuating mechanism. Once individuals have disaffiliated from the church or have not been socialized religiously, they themselves become conduits for further secularization because they normally do not socialize their children religiously. As we have shown, this is true for both East and West Germany, with the process being extremely rapid in the former. The fact that the churches had been useful focal points for opposition in the GDR in the late 1980s did not revive religion in East Germany, and nor did the new religious freedom that resulted from reunification. Our data suggest that there have been some tendencies of resacralization in East Germany, which are undoubtedly due to the disappearance of anti-religious state ideology and the new religious freedom, as well as to the fact that East Germans have mingled with a more religious West German population. Seen from a broader perspective, however, it is clear that East Germany has continued its secular transition since 1989, making it one of the most secular regions in the world today.

Why other countries ruled by socialism do not show the same trajectories as the GDR is an interesting question (Meulemann, 2004). After all, Poland, Slovenia, Hungary, and the Czech Republic seem to fit the model relatively well. Why were the socialist in Poland, Croatia, Bulgaria, and Romania, which also tried to secularize their countries, much less successful than East Germany (Müller and Neundorf, 2012, Northmore-Ball and Evans, 2014)? We can offer four tentative explanations for the secularizing success of the GDR, which can be regarded as having a cumulative effect. First, the GDR was mostly Protestant and, since on average Protestants practise their religion less and have a weaker religious identity than Catholics, the GDR socialist rulers simply had a weaker opponent (Pickel, 2003). Second,

East German repression was more systematic, rational, and consistent than in other countries, with the state using a slow and piecemeal strategy to push back the churches, thereby avoiding the creation of martyrs. In contrast, the less rational approach adopted by countries such as Poland provoked resistance (Pollack and Rosta, 2017: 257ff.). Moreover, since the economy worked better in East Germany than in other socialist countries, there was a stronger legitimation for repression. Third, the Nazi past of East Germany meant that the churches were not able to make a meaningful connection between national and religious identity, whereas countries such as Poland, Russia, Ukraine, and Greece could. In other words, there was a permanent stain on German national identity, and it could therefore not be used to bolster religious belonging and practice (Berezhnaya and Hein-Kircher, 2019). Fourth, the churches were under prolonged pressure in East Germany for the *second time* (after Nazism), and religion may have collapsed more easily in East Germany, since it was already weakened.

We hope to have demonstrated that treating Germany as a single country hides important information, and that the East German case is not an inexplicable or “anomalous” case. Rather, it represents a fascinating natural experiment that shows how states may interrupt religious transmission and thus create an accelerated process of secular transition.

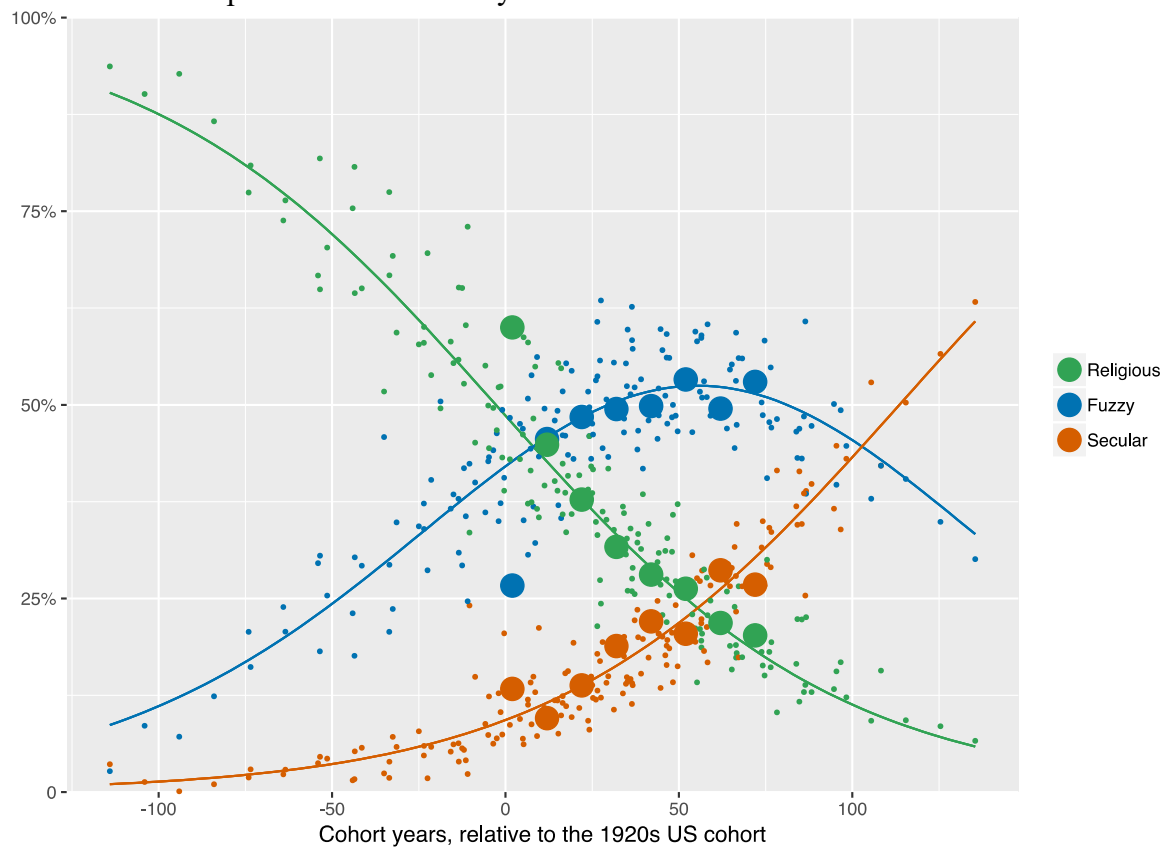
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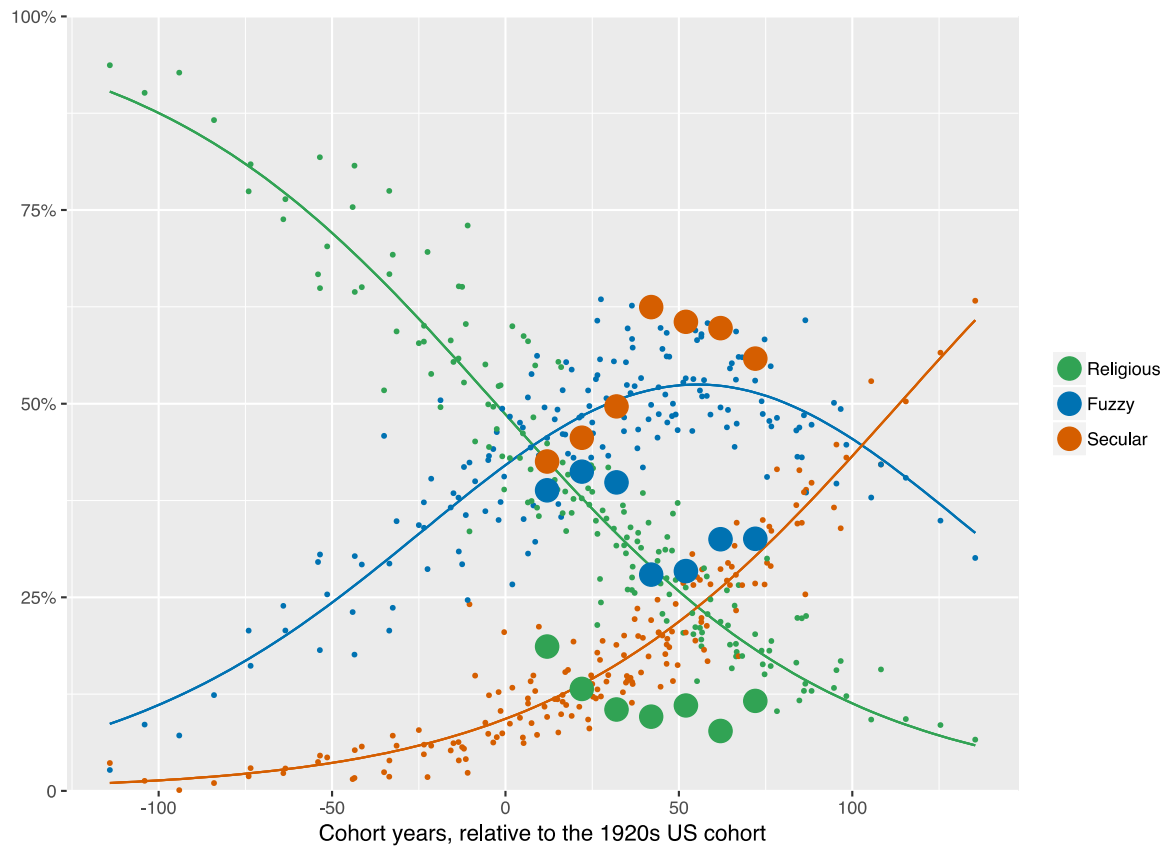
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Figure 1 Percentages of religious, fuzzy, and secular, according to cohort groups in Europe and West Germany



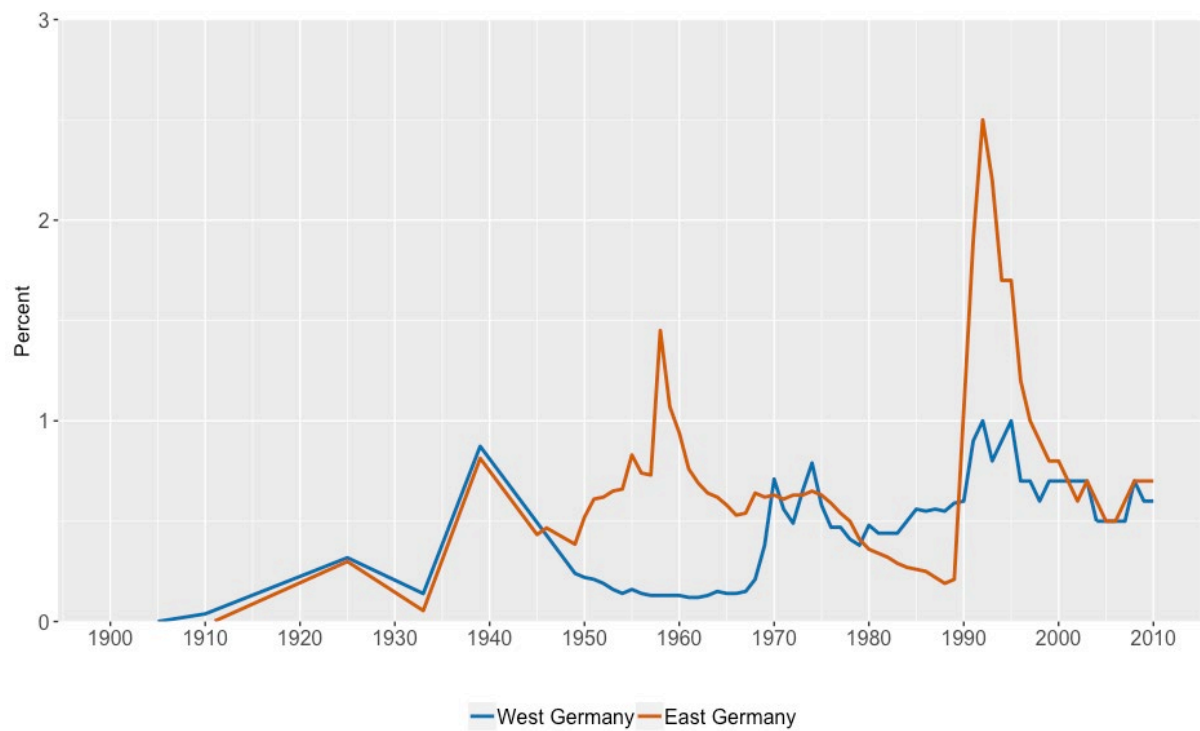
Note: Enlarged points are country-cohort percentages of West Germany. X-axis is theoretical time on the secular transition relative to the 1920 US cohort (set to 0)

Figure 2 Percentages of religious, fuzzy, and secular, according to cohort groups in Europe and East Germany



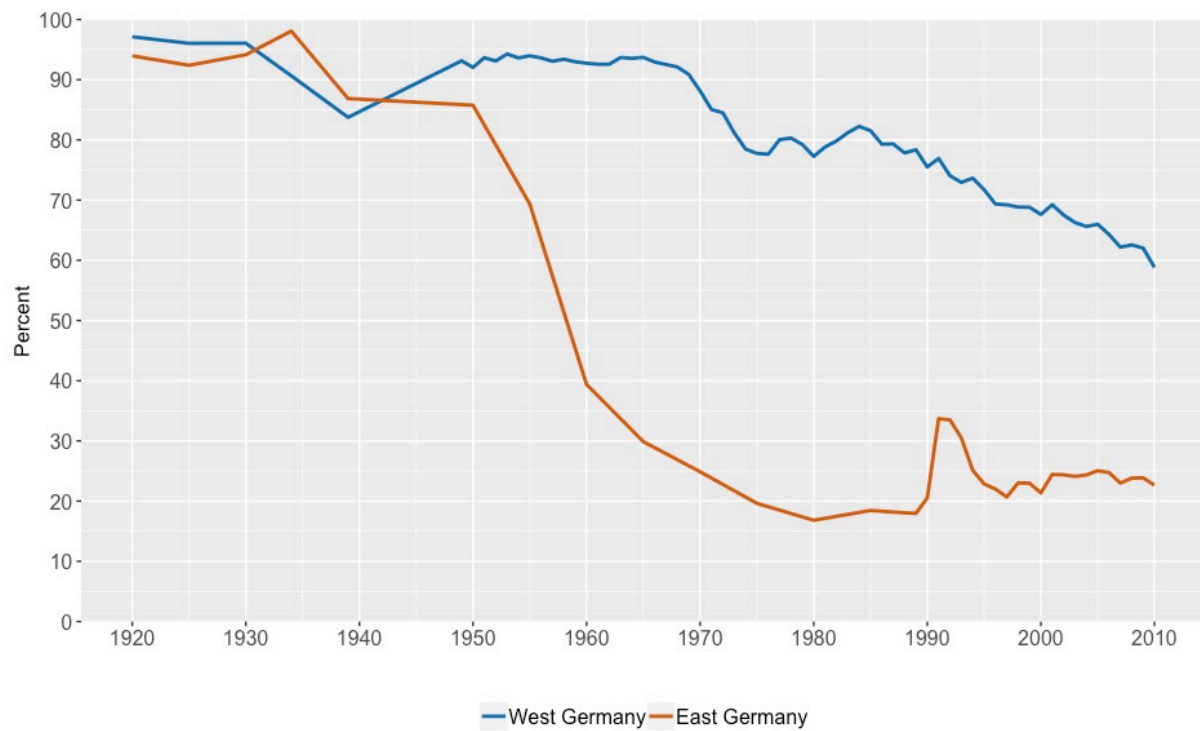
Note: Enlarged points are country-cohort percentages of East Germany. X-axis is theoretical time in cohort years on the secular transition relative to the 1920 US cohort (set to 0)

Figure 3 Rates of disaffiliation in East and West Germany, 1900-2010



Note: Rate of disaffiliation is calculated as number of disaffiliations divided by number of Protestants and Catholics. Data from Pollack (1994: Anhang Tabelle 2), and Pollack and Rosta (2017: 77).

Figure 4 Protestant and Catholic baptisms in East and West Germany, 1920-2010



Note: Rate of baptism is calculated as the number of Protestant and Catholic baptisms in a year, divided by total number of births in the population. Data from Pollack (1994: 384, 2000: 31-32).

Table 1 Descriptive information

Variable	West Germany		East Germany	
	N	%	N	%
Belief in god				
No belief in God	986	(15.8%)	1436	(55.4%)
Fuzzy belief in God	1940	(31.1%)	632	(24.4%)
Certain belief in God	3318	(53.1%)	524	(20.2%)
Service attendance				
Never	1886	(30.3%)	1643	(65.7%)
Rarely	1601	(25.7%)	417	(16.7%)
Several times a year	1359	(21.8%)	247	(9.9%)
One to three times a month	672	(10.8%)	90	(3.6%)
Weekly or more	702	(11.3%)	104	(4.2%)
Religion - Mediator				
Protestant	4809	(76.7%)	667	(25.6%)
None	1464	(23.3%)	1936	(74.4%)
Disaffiliated	1084	(17.3%)	696	(26.7%)
Never having had a religion	380	(6.1%)	1240	(47.6%)
Gender				
Male	3123	(49.8%)	1278	(49.1%)
Female	3149	(50.2%)	1324	(50.9%)
Wave				
1992	1935	(30.8%)	874	(33.6%)
2002	2181	(34.8%)	858	(33.0%)
2012	2157	(34.4%)	870	(33.4%)
	Mean	sd	Mean	sd
Year of birth				
Mean (standard deviation)	1955.29	(19.44)	1957.41	(18.52)
Education				
Mean (standard deviation)	2.76	(0.86)	2.84	(0.78)
Range	1 - 4		1 - 4	
N	6273	(100.0%)	2602	(100%)

* Note: Data weighted by jweight

Table 2 OLS Regression in East and West Germany: Religious service attendance, 1992, 2002, 2012

	Model 1	Model 2	Model 3	Model 4	Model 5
		+ Waves	+ Year of birth + Age ²	+ Other controls	+ Mediator: None
West Germany (base East)	0.84 ** (0.03)	0.85** (0.03)	0.80** (0.03)	0.83** (0.03)	0.07* (0.03)
Mediator: None (base Protestant)					-1.49** (0.03)
<i>controls</i>					
Wave 2002		-0.17 (0.03)	-0.04 (0.03)	0.04 (0.03)	0.12** (0.03)
Wave 2012		-0.26 (0.04)	-0.01 (0.01)	0.07(*) (0.04)	0.16** (0.03)
Year of birth			-0.01** (0.01)	-0.02** (0.01)	-0.01** (0.00)
Age ²			0.09** (0.01)	0.10** (0.01)	0.05** (0.01)
Female				0.21 ** (0.03)	0.20** (0.02)
In education				0.20(*) (0.11)	0.15 (0.09)
Hauptschule				-0.02 (0.08)	-0.02 (0.07)
Realschule/POS				-0.08 (0.08)	0.01 (0.07)
Gymnasium				0.07 (0.08)	0.18* (0.07)
Unemployed				-.15** (0.06)	-0.14** (0.05)
Live with partner				0.13** (0.03)	0.11** (0.03)
Urban/rural				-0.07** (0.01)	-0.04** (0.01)
Intercept	1.63** (0.03)	1.54** (0.03)	1.54** (0.03)	1.56** (0.09)	2.49** (0.08)
F	777.3	281.7	302.0	130.4	376.1
df	8379	8377	8375	8367	8366
R ² adj	0.085	0.092	0.152	0.168	0.386
Delta df		2	4	8	1
F		31.1	167.7	19.7	2969.8

Note : (*) = p<.10, * = p < .05, ** = p < 0.01, Unstandardized coefficients with standard errors in parentheses. Nested models.

Table 3 Ordinal logistic Regression in East and West Germany: Belief in God, 1992, 2002, 2012

	Model 1	Model 2	Model 3	Model 4	Model 5
		+ Waves	+ Year of birth + Age ²	+ Other controls	+ Mediator: None
West Germany (base East)	1.95** (0.05) 1.52** (0.06)	1.95** (0.05) 1.53** (0.06)	1.95** (0.05) 1.53** (0.06)	1.99** (0.06) 1.54** (0.06)	0.84** (0.07) 0.41** (0.07)
Mediator: None (base Protestant)					-2.83** (0.06)
Wave 2002 (base 1992)		0.06 (0.06) -0.09 (0.06)	0.23** (0.07) 0.12* (0.06)	0.36** (0.07) 0.26** (0.06)	0.63** (0.08) 0.42** (0.07)
Wave 2012 (base 1992)		-0.05 (0.06) -0.53** (0.06)	0.30** (0.07) -0.12** (0.06)	0.45** (0.08) 0.06** (0.07)	0.75** (0.09) 0.16** (0.08)
Year of birth			-0.02** (0.00) -0.03** (0.00)	-0.02** (0.00) -0.02** (0.00)	-0.02** (0.00) -0.02** (0.00)
Age ²			0.13** (0.03) 0.12** (0.03)	0.11** (0.03) 0.10** (0.03)	-0.01 (0.04) 0.01 (0.03)
Female (base male)				0.43** (0.13) 0.34** (0.05)	0.49** (0.06) 0.37** (0.05)
In education				-0.08 (0.18)	-0.14 (0.19)
Hauptschule				-0.13 (0.13)	-0.14 (0.14)
Realschule/POS				-0.42** (0.13)	-0.36** (0.14)
Gymnasium				-0.33* (0.13)	-0.20 (0.14)
Unemployed				-0.22** (0.10) -0.25** (0.11)	-0.29** (0.12) -0.23(*) (0.13)
Live with partner				0.16* (0.06) 0.11(*) (0.05)	0.16* (0.07) 0.08 (0.06)
Urban/rural				-0.12** (0.02) -0.12** (0.02)	-0.05* (0.02) -0.07 (0.02)
Intercepts	-0.27** (0.04) -2.39** (0.05)	-0.27** (0.05) -1.18** (0.06)	-0.59** (0.06) -1.60** (0.06)	-0.28(*) (0.16) -1.22(**) (0.15)	1.60** (0.18) 0.23** (0.17)
Log-likelihood	-8407.3	-8346.8	-8083.8	-7995.3	-6698.5
df	17034	17030	17026	17014	17013
Nagelkerke	0.183	0.196	0.252	0.270	0.496
McFadden	0.082	0.089	0.117	0.127	0.269
Delta df		4	4	12	1
Delta Chi ²		121.0	526.0	177.0	2594.0

Note : (*) = $p < .10$, * = $p < .05$, ** = $p < 0.01$. Logits with standard errors in parentheses. Nested models. Lower coefficient used to calculate probability of being in “religious” category, upper coefficient used to calculate probability of being in “fuzzy” category. For the variable none and the education dummies, only one coefficient is estimated, in order to prevent Hauck-Donner estimation problems.

Appendix (Can the state accelerate the secular transition? Secularization in East and West Germany as a natural experiment)

1. Simulation of maximum effect of emigration on church membership in GDR

One may wonder whether the reduction in church membership in the GDR is due to emigration before the building of the wall in 1961. While we cannot rule out this bias, we can calculate its maximum effect between 1949 and 1961. According to Pollack (1994:507, 2000:18), 92.4% of the East German population in 1949 was a church member (either Lutheran or Roman-Catholic). Between 1949 and 1961, a total of 3.4 million people emigrated from the GDR, mostly to the FRG (Effner and Heidemeyer 2005:27f.). If between 1949 and 1961 *only church members* had emigrated, then we would ceteris paribus have ended up in 1961 with 90.7% of church members (Table T1). We here just subtract 3.4 Million from the church members and leave the number of nones as is. This would have resulted in a reduction of church members between 1949 and 1961 of only 1.7%. In fact, though, the reduction of church members between 1949 and 1961 was 17.6%! After 1961, emigration was extremely reduced because of the wall. At least for religious belonging, then, the possible bias caused by emigration is very small.

Table T1 Calculating the maximum importance of emigration on church membership in the GDR

	Population	with religion	without religion	% with religion	% without religion
Actual					
1949/1950	18'892'000	17'456'208	1'435'792	92.4%	7.6%
1961	16'433'000	12'291'884	4'141'116	74.8%	25.2%
Simulated					
1961	15'492'000	14'056'208	1'435'792	90.7%	9.3%
Difference actual				17.6%	
Difference simulated				1.7%	

2. Mathematical explanation of the shifting process in the Voas model

We give here the (slightly simplified) explanation of the shifting process in the Voas model according to Brauer (2018:8). The shifting process in its strict form is based on an ordinal regression with the dependent variable capturing the percentage of religious/fuzzy/secular for every country-cohort, and the independent variables birth year of individual i in country j , and country. The model gives out one coefficient for birth year and as many country coefficients as there are countries (minus 1, the reference country). Since the Voas model assumes that there can only be a single set of religious, fuzzy, and secular trajectories for all countries, each country's set of year-of birth values have to be linearly adjusted (i.e., without stretching any country's data), that is, they have to be "shifted to the left" or "shifted to the right", respective to a fixed reference country. In practice, we linearly transform the country coefficients by dividing them through the birth year coefficient (a slope), thus giving us the amount of years that every country has to be shifted. The common reference point is an arbitrarily chosen country, in our case the US. Shifting the countries this way is *not* a special characteristic of the model itself. Rather, it is an alternative interpretation of a conventional ordinal logistic regression model.

To see the construction of the shifter mathematically, consider

$$P(\text{Religious}|x) = 1 - \text{logit}^{-1}(-c + \alpha + \beta_1 x_{ij} + \beta_j) = 1 - \frac{1}{1 + e^{-c + \alpha + \beta_1 x_{ij} + \beta_j}}$$

With c = cutoff or threshold, α = intercept, β_1 = coefficient for year of birth = , x_{ij} = the year of birth for respondent i from country j , and β_j = intercept for country j .

Let us now fix arbitrarily a $P(\text{Religious}|x)$, for convenience, 0.5, since this will mean that the term $-c + \alpha + \beta_1 x_{ij} + \beta_j$ has to be equal to 0. Solving for x_{ij} gives us

$$x_{ij} = \frac{c - \alpha - \beta_j}{\beta_1}$$

Since c and α are constants equal for all countries, and since the common reference point for the theoretical time axis has to be arbitrarily chosen, we can find our country shifter as

$$\text{countryshifter} = x_{ij} = \frac{\beta_j}{\beta_1}$$

Because the reference country has no dummy variable, it's value of β_j is implicitly constrained to 0. Consequently, it is not shifted at all.

3. Fit Index of different countries with respect to the Voas model

We use the substantive fit index proposed by Brauer (2018:10) that answers the question: “How closely do the empirical religious, fuzzy, and secular proportions of a specific cohort (defined by decade of birth) in a specific country align with their predicted proportions from a given model?” It substantively calculates what percentage in predicted percentages would have to be shifted to arrive at the actual percentages and deducts this percentage from 100%.

The fit index is calculated as $\text{fit} = (\sum_{i,n} \min(\text{PCT}(\text{type})^{\text{Actual}}, \text{PCT}(\text{type})^{\text{Predicted}}) / n$

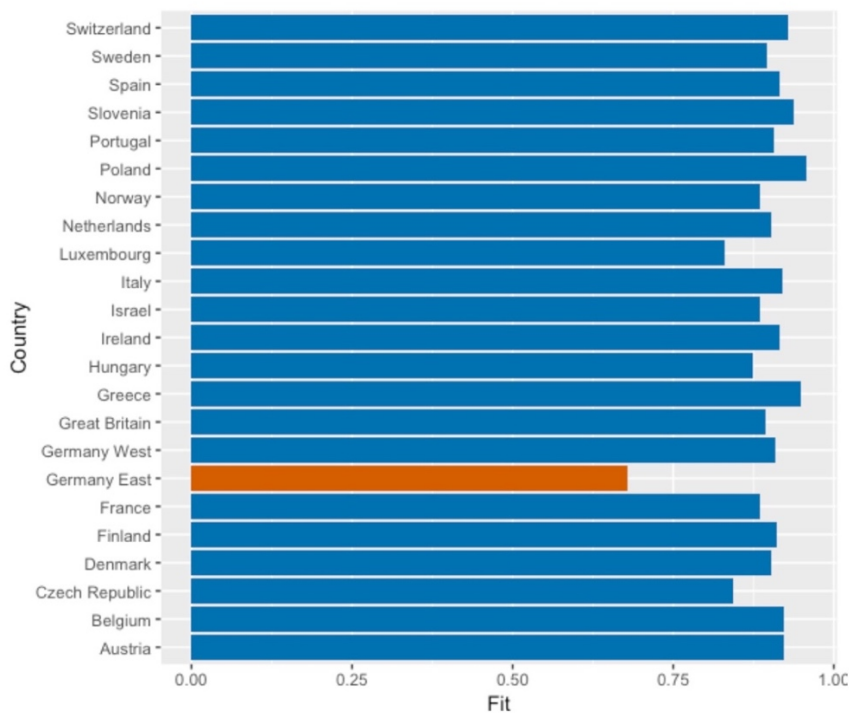
Where i is type (religious, fuzzy, secular) and n is the cohort. The following simple example (table T2) shows how a fit for two cohorts is calculated according to the formula. We see that for the predicted values in cohort 1 we would have to shift 10%, that is 5% from fuzzy to religious and 5% from secular to religious, to arrive at the actual percentages. This gives us a fit for the cohort 1 of $100 - 10 = 90$. The fit for the two cohorts is then just the average of the two cohort fits.

Table T2

	Actual	Predicted	Min(Actual/ Predicted)	Fit
Cohort 1				
Religious	70	60	60	
Fuzzy	25	30	25	
Secular	5	10	5	
Sum(Min)			90	
Cohort 2				
Religious	80	65	65	
Fuzzy	10	15	10	
Secular	10	20	10	
Sum(Min)			85	
				$(90+85)/2$
				87.5%

Using this fit measure, we arrive, for the strict model and under the assumption that West and East Germany are to be seen as one country, at a fit of only .679 for East Germany meaning that 67.9% of the respondents are classified correctly into the religious, fuzzy, and secular categories and that 32.1% would have to be shifted to arrive at the actual percentages. As can be seen in Figure A2, this fit is substantially worse than the fit for all other countries.

Figure F1 Fit for different West and Central European countries under the strict model and the “one country” condition for East and West Germany



Note: Fit for for the strict model under the assumption that West and East Germany are to be seen as one country

Table T3 shows that this pattern holds not just for the strict, but also for the control model.

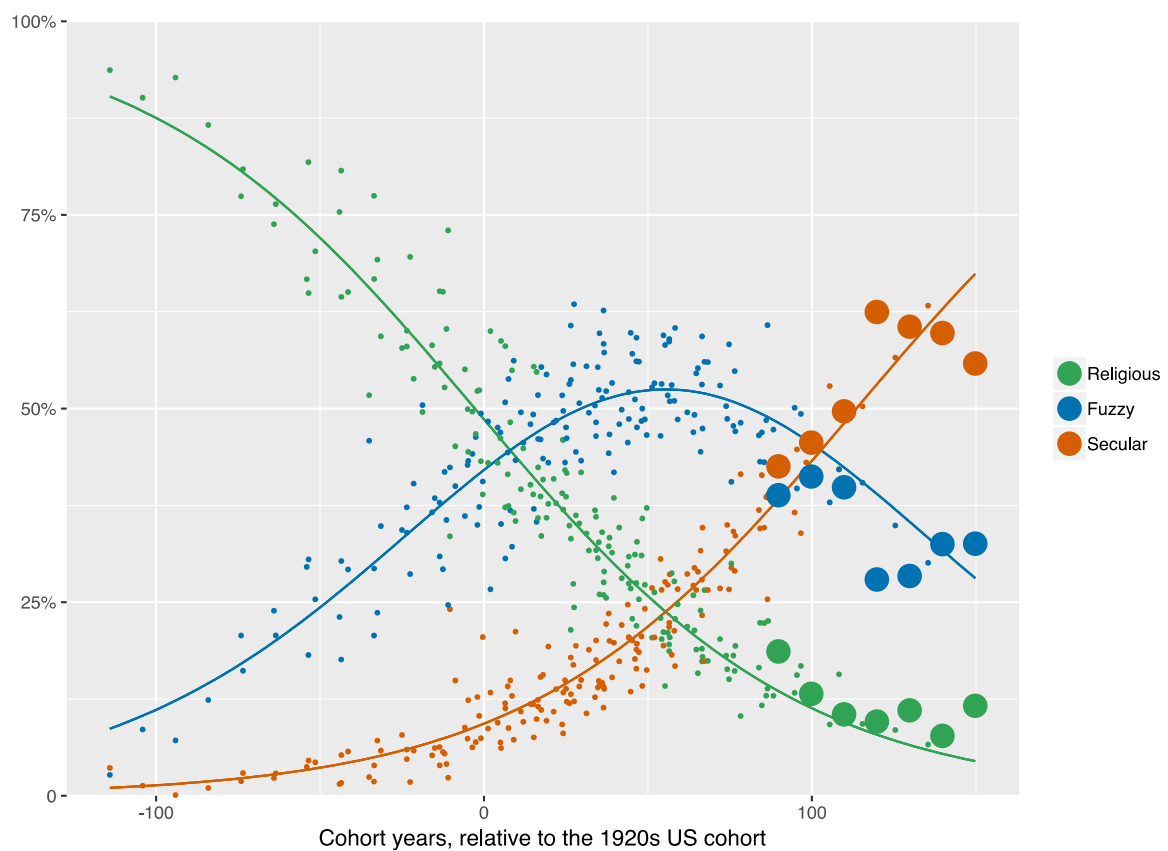
Table T3 Fit of West and East Germany for the strict and control model under two conditions

	Strict model	Control model
<i>Condition 1: “Same country”</i>		
West Germany	0.909	0.906
East Germany	0.679	0.641
<i>Condition 2: “Different country”</i>		
West Germany	0.909	0.906
East Germany	0.933	0.930

4. Percentages of religious, fuzzy, and secular, according to cohort groups in Europe and East Germany (shifted)

In Figure F2, we present a situation in which East Germany is not constrained to be at the same point in time as West Germany (Figure 1 in the text), but is moved freely to the place where it best fits the fit function. The enlarged points represent the percentages of Religious, Fuzzy, and Secular of different cohorts in East Germany. It is apparent that East Germany is shifted strongly “to the right”, meaning that the model puts it 115 years ahead of the reference country US and 78 years ahead of West Germany in the secular transition process.

Figure F2 Percentages of religious, fuzzy, and secular, according to cohort groups in Europe and East Germany (shifted)



5. Comparison of church statistics and retrospective survey 1992

The simple simulation in Table T4 compares the percentages of church members, disaffiliated, and never belonged that would be expected in 1991 from church statistics and that is apparent in the KMU 1992 survey. The simulation demonstrates that the KMU survey shows 11.4% less Protestant members, 10.5% more disaffiliations and 0.9% more “never belonged” than the Church statistics. It is clear that different instruments give different estimates; at the same time, these differences are not very big. The “true values” may well be somewhere between the values given here by the two different methods. That having been said, the existence of a “true value” is itself questionable, since the social reality is in this case itself “fuzzy”. A person may have subjectively disaffiliated in a given year, but not have cared to tell the church who still thinks that the person is a member. Because of the general political situation, it is not clear if the person had to tell the church when disaffiliating. In such a case it is not really possible to know whether the person was “really” still a member or not, one can only say that from the organizations’ point of view she was, whereas from her own point of view she wasn’t.

Table T4 Percentages of members, disaffiliated, and never belonged, according to church statistics 1991 and KMU 1992 retrospective data in East Germany

	Church statistics 1991		KMU 1992		Difference %
	N	%	N	%	%
Protestant	5’040’000 ⁽¹⁾	34.3%	200	22.9%	11.4%
Disaffiliated	3’077’513 ⁽²⁾	20.9%	274	31.4%	-10.5%
Never belonged	6’578’487 ⁽³⁾	44.8%	399	45.7%	-0.9%
Total	14’696’000 ⁽⁴⁾	100.0%	873	100.0%	

Sources:

(1) Number of Protestants: Pollack/Krüggeler (2016)

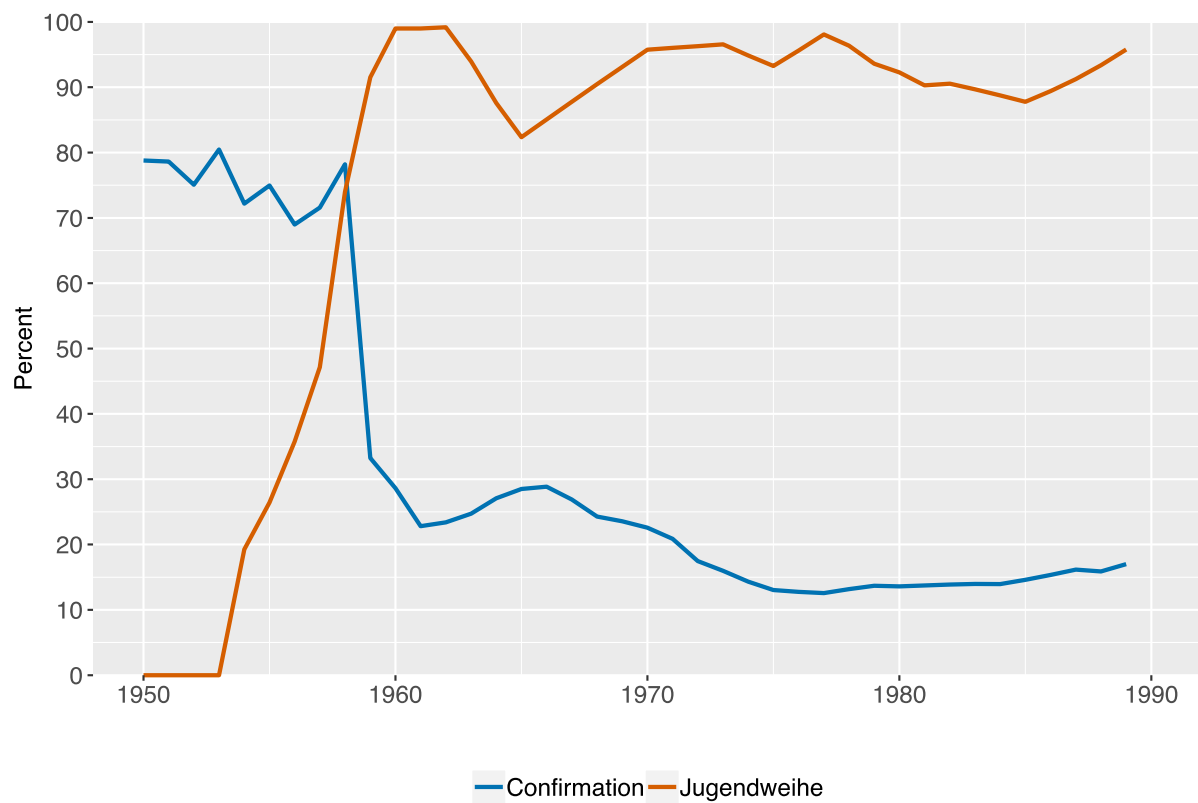
(2) Disaffiliated: all disaffiliations during 40 years of GDR that should show up in the 1992 church statistics. Calculated by adding disaffiliated Protestants + an estimation of disaffiliated of other religions (disaffiliation rate assumed to be equal to that of Protestants). This number is corrected by a factor of 0.25 because we lose cohorts by cohort replacement during the 40 years.

(3) Calculated as the difference of total population (including other religions) – (With religion or Disaffiliated)

(4) Total of Protestant, Disaffiliated and Never Belonged
KMU data weighted with jweight

6. Confirmation and Jugendweihe

Figure F3 Protestant confirmations and *Jugendweihe* in East Germany, 1959-1990

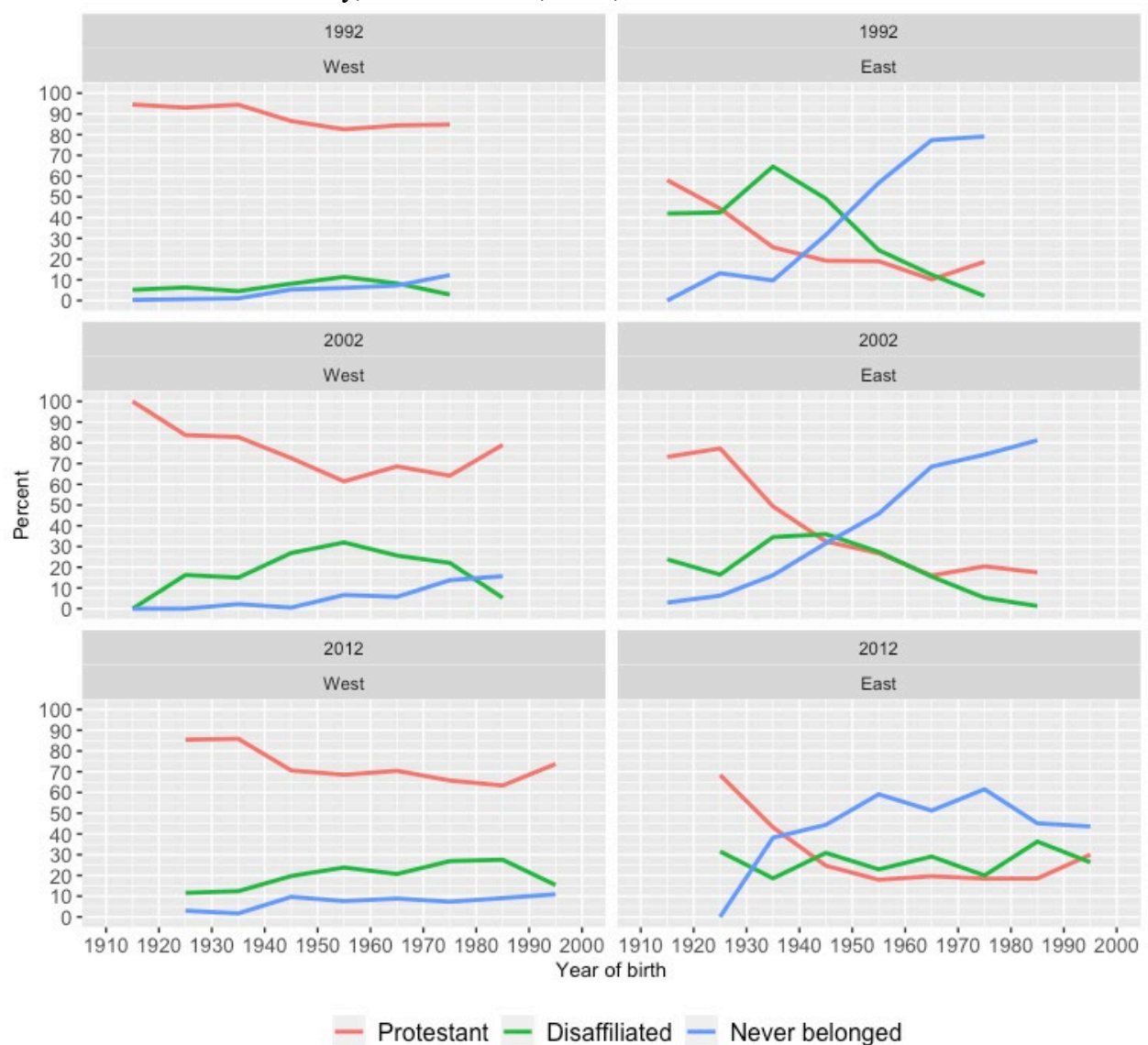


Note: Data on Protestant confirmations from Pollack (1994:415) and Pollack/Krüggeler (2016); data on *Jugendweihe* from Döhnert (2000), Urban/Weinzen (1984), Wentker (1995: 156, 163-164). Percentage of 14-year-olds (until 1958) and of 15-year-olds (after 1958).

7. Protestant, disaffiliated, and never belonging according to birth cohorts

This series of figures shows the percentages of respondents who answered that they were protestant or none because they were disaffiliated or had never been belonging to a religion according to birth cohort in East and West Germany. We very clearly see how strong the effect of the East German regime treatment was on this variable. While we see a relatively slow decline in West Germany, in East Germany, we see the much higher disaffiliations in East Germany with a peak in the 1950s, and the rapid rise of individuals who “never belonged”. This very different pattern is observable in all waves, but perhaps clearest in the responses of individuals asked in 1992.

Figure F4 Percentage of respondents saying that they were Protestant, had disasaffiliated, or had never belonged to a religion, according to birth cohort in East and West Germany, in waves 1992, 2002, 2012



Note: Data weighted with jweight.

8. Ordinal logistic regression with religious service attendance

Table T5 Ordinal logistic Regression in East and West Germany: Religious service attendance, 1992, 2002, 2012

	Model 1	Model 2	Model 3	Model 4	Model 5
		+ Waves	+ Year of birth + Age ²	+ Other controls	+ Mediator: None
West Germany (base East)	1.44** (0.05)	1.46** (0.05)	1.45** (0.05)	1.51** (0.05)	0.20** (0.06)
Mediator: None (base Protestant)					-3.10** (0.06)
Wave 2002 (base 1992)		-0.24** (0.05)	-0.05 (0.05)	0.08 (0.06)	0.31** (0.06)
Wave 2012 (base 1992)		-0.58** (0.05)	-0.21 (0.05)	-0.08 (0.06)	0.17* (0.07)
Year of birth			-0.02** (0.00)	-0.02** (0.00)	-0.02** (0.00)
Age ²			0.12** (0.02)	0.13** (0.02)	0.05** (0.03)
Female (base male)				0.33** (0.04)	0.40** (0.04)
In education				0.34(*) (0.12)	0.34 (0.18)(*)
Hauptschule				-0.03 (0.12)	-0.06 (0.13)
Realschule/POS				-0.12 (0.12)	0.02 (0.13)
Gymnasium				0.13 (0.12)	0.35** (0.13)
Unemployed				-0.34* (0.10)	-0.40** (0.11)
Live with partner				0.23** (0.05)	0.25** (0.05)
Urban/rural				-0.12** (0.02)	-0.07** (0.02)
Intercepts	-0.62** (0.04) -1.67** (0.05) -2.69** (0.05) -3.48** (0.05)	-0.36** (0.05) -1.43** (0.05) -2.46** (0.06) -3.24** (0.06)	-0.70** (0.05) -1.81** (0.06) -2.89** (0.06) -3.72** (0.07)	-0.69** (0.14) -1.82** (0.14) -2.92** (0.14) -3.75** (0.15)	1.12** (0.15) -0.44* (0.15) -1.71** (0.15) -2.59** (0.16)
Log-likelihood	-11664.0	-11597.31	-11341.53	-11253.51	-9814.657
df	33519	33517	33515	33507	33508
Nagelkerke	0.111	0.126	0.181	0.200	0.449
McFadden	0.038	0.044	0.065	0.072	0.191
Delta df		2	2	8	1
Delta Chi ²		133.39	511.57	176.04	2887.6

Note : (*) = p<.10, * = p < .05, ** = p < 0.01. Logits with standard errors in parentheses. Nested models.

9. A note on the effect of the waves

This note analyses the effect of the Simpsons's paradox that can be observed in the effect of the waves in our regression models, both for service and belief in god. As shown in the main text, our mediation results remain unchanged when we control for waves by introducing two dummies, one for wave 2002, and one for wave 2012 (wave 1992 is the reference category). However, regarding the influence of wave, we can observe an interesting – if mild – case of “Simpson's Paradox”, that is a phenomenon, “whereby the association between a pair of variables (X; Y) reverses sign upon conditioning of a third variable, Z, regardless of the value taken by Z” (Pearl 2014:8). For example, regarding the case of service, while wave 2002 and wave 2012 have a negative, although not significant, effect in model 2, introducing year of birth and none leads the coefficients of wave to become increasingly positive, and in model 5 significant (Table T6, this is a reproduction of table 3 in the main text).

Table T6 Ordinal logistic Regression in East and West Germany: Belief in God, 1992, 2002, 2012

	Model 1	Model 2	Model 3	Model 4	Model 5
		+ Waves	+ Year of birth + Age ²	+ Other controls	+ Mediator: None
West Germany (base East)	1.95** (0.05) 1.52** (0.06)	1.95** (0.05) 1.53** (0.06)	1.95** (0.05) 1.53** (0.06)	1.99** (0.06) 1.54** (0.06)	0.84** (0.07) 0.41** (0.07)
Mediator: None (base Protestant)					-2.83** (0.06)
Wave 2002 (base 1992)		0.06 (0.06) -0.09 (0.06)	0.23** (0.07) 0.12* (0.06)	0.36** (0.07) 0.26** (0.06)	0.63** (0.08) 0.42** (0.07)
Wave 2012 (base 1992)		-0.05 (0.06) -0.53** (0.06)	0.30** (0.07) -0.12** (0.06)	0.45** (0.08) 0.06** (0.07)	0.75** (0.09) 0.16** (0.08)
Year of birth			-0.02** (0.00) -0.03** (0.00)	-0.02** (0.00) -0.02** (0.00)	-0.02** (0.00) -0.02** (0.00)
Age ²			0.13** (0.03) 0.12** (0.03)	0.11** (0.03) 0.10** (0.03)	-0.01 (0.04) 0.01 (0.03)
Female (base male)				0.43** (0.13) 0.34** (0.05)	0.49** (0.06) 0.37** (0.05)
In education				-0.08 (0.18)	-0.14 (0.19)
Hauptschule				-0.13 (0.13)	-0.14 (0.14)
Realschule/POS				-0.42** (0.13)	-0.36** (0.14)
Gymnasium				-0.33* (0.13)	-0.20 (0.14)
Unemployed				-0.22** (0.10) -0.25** (0.11)	-0.29** (0.12) -0.23(*) (0.13)
Live with partner				0.16* (0.06) 0.11(*) (0.05)	0.16* (0.07) 0.08 (0.06)
Urban/rural				-0.12** (0.02) -0.12** (0.02)	-0.05* (0.02) -0.07 (0.02)
Intercepts	-0.27** (0.04) -2.39** (0.05)	-0.27** (0.05) -1.18** (0.06)	-0.59** (0.06) -1.60** (0.06)	-0.28(*) (0.16) -1.22** (0.15)	1.60** (0.18) 0.23** (0.17)
Log-likelihood	-8407.3	-8346.8	-8083.8	-7995.3	-6698.5
df	17034	17030	17026	17014	17013
Nagelkerke	0.183	0.196	0.252	0.270	0.496
McFadden	0.082	0.089	0.117	0.127	0.269
Delta df		4	4	12	1
Delta Chi ²		121.0	526.0	177.0	2594.0

Note : (*) = $p < .10$, * = $p < .05$, ** = $p < 0.01$. Logits with standard errors in parentheses. Nested models. Lower coefficient used to calculate probability of being in “religious” category, upper coefficient used to calculate probability of being in “fuzzy” category. For the variable none and the education dummies, only one coefficient is estimated, in order to prevent Hauck-Donner estimation problems.

Recent advances in causal reasoning have shown that Simpson's paradox cannot be resolved by relying only on the data, but can only be satisfactorily treated by adding context knowledge and assumptions about causality (Pearl 2014). To better understand how our Simpson's Paradox is created, it is important to note, that it can be reproduced by using only four of our variables: birthyear, none, wave, and service. In Figure F2 (a) we show the correlations between these four variables. To simplify, wave is here a three step variable (levels 1,2,3) that is treated as numeric. We find the significant negative relationship between wave and service that we also saw in table F2, model 3. In F2 (b), we see the standardized regression coefficients between the same variables, assuming causal relationships as given by the arrows. Note that the sign of the influence of wave on service has reversed, it is now positive, just as in F2, model 5.

What should we now say about the overall influence of wave on service? Assuming that the causal model below is correct, and using the rules given by Pearl (2014), we have to condition on birthyear, but not on none, if we want to find the correct size of the influence of wave on service. We do this in model F2 (c) and find a slightly positive influence of wave on service that is not significant on the .05 level, but significant on the .10 level. This positive influence had been masked in the case where we did not condition on other variables. We can only speculate as to why we find this (mild) form of Simpson's paradox. One possibility is that the new freedom in East Germany plays a role after all and has led to a slight rise in service attendance among Protestants that becomes only visible when controlling for other variables. Another possibility is that the mean attendance among Protestants rises precisely because a certain percentage of Protestants (those with lesser attendance) become nones. Because only those with higher attendance remain affiliated, this may lead *ceteris paribus* to a rise in average Protestant attendance even though no Protestant raises his/her attendance individually. In any case, as already mentioned, this effect of wave has no influence on our overall findings regarding our mediation analysis.

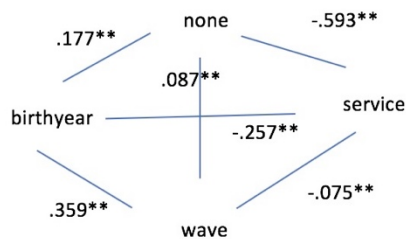
Figure F2 Correlations and standardized regression coefficients between birthyear, none, wave, and service

10. Robustness checks

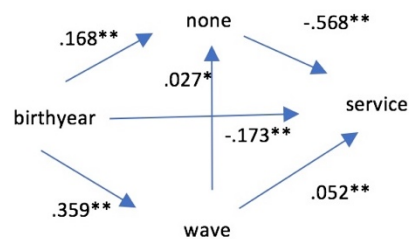
We inspected the robustness of our findings by redoing the analysis under three different conditions. Thus, we repeated the analysis with the KMU data by confining the analysis to two adjacent and culturally very similar regions, one from the West (Niedersachsen), and one from the East (Sachsen-Anhalt and Sachsen). In this way, we could exclude possible unobserved confounders linked to geographical and cultural differences. (2) We also reran the analysis only with wave 1 (1991) of the KMU data. In this way, we exclude possible

unobserved confounders linked to the fact that later waves might have been more influenced by what happened after the re-unification. Finally, we replicated the analysis with the ESS dataset 2002 (used in our test of the Voas-model). While the ESS dataset has the disadvantage of not capturing the situation right after the reunification, and while it does not permit to control for where people grew up, it does nevertheless permit an independent test. In all these analyses we find very similar results as those presented here, leading us to conclude that the results are robust. The output of these analyses is available upon request.

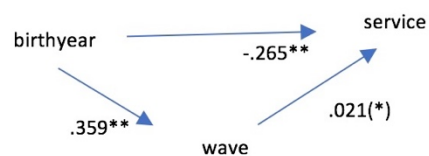
(a) Correlations



(b) Regressions (beta)



(c) Regressions (beta)



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ⁱⁱ We use the term “socialist” as a shorthand for “state socialist” to describe the GDR regime.

ⁱⁱⁱ Data can be downloaded at <https://www.europeansocialsurvey.org>.

^{iv} Data can be ordered at <https://www.gesis.org/home>.

^v For 1992 and 2012, these data are weighted with the weights provided by the KMU; for the 2002 dataset, we calculated the weights ourselves, based on the Allbus 2002.

^{vi} We use the terms “generation” and “cohort” interchangeably.

^{vii} Calculated as indirect effect/total effect: .77/.84

^{viii} Calculated according to the formula given in Breen et al. (2013: 172)