

# **Losing my religion as a natural experiment: How state pressure and taxes led to church disaffiliations between 1940 and 2010 in Germany**

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The sociological literature has produced a remarkably consistent picture of the quantitative patterns of religious disaffiliations in western countries. This paper argues, and demonstrates, that strong changes in a social context may lead individuals to disaffiliate rapidly, leading to very different aggregate effects from those in the “western model”. We use the unique situation of the separation of Germany from 1949 to 1989 and its subsequent reunification as a “natural experiment” to show just how much the relationships routinely found can be disrupted under changed conditions. The state socialist “treatment” affected religious disaffiliations in East Germany profoundly as it (a) made disaffiliations 10 times more probable in the East than in the West in the 1950s and 1960s, (b) shielded East German church members from factors that led to mass disaffiliations in the West in the late 1960s and early 1970s, (c) reversed the education-disaffiliation link, thus making disaffiliation more likely among the less educated, and (d) led to an especially strong increase of disaffiliations in the East right after the reunification.

## **1. Introduction<sup>1</sup>**

The sociological literature has produced a remarkably consistent picture of the quantitative patterns of religious disaffiliation in the west. In most western countries, religious disaffiliations were very rare up to the late 1960s, started with the countercultural movement (“the 1960s”) and have been slowly rising ever since.<sup>2</sup> They are especially likely among young, educated, urban, and male individuals and are often triggered by specific events (e.g. church scandals, tax increases) (Thiessen and Wilkins-Laflamme 2017, Berghammer, Zartler, and Krivanek 2018, De Graaf, Need, and Ultee 2004, Need and De Graaf 1996, McClendon

and Hackett 2014). Changes in the political regulation of religion (i.e. laws about the public recognition or the financing of religion) are in this literature not mentioned as being important determinants of disaffiliations.

This paper uses the unique situation of the separation of Germany from 1949 to 1989 and its subsequent reunification as a “natural experiment” to show just how much the relationships routinely found can be disrupted under changed conditions. While some of our longitudinal data permits observation as far back as 1910, our main argument refers to what happened in Germany between 1940 and 2010. We argue, and demonstrate, that strong changes in social context may lead (bounded) rational individuals to disaffiliations that create very different aggregate effects from those in the “western model”. The German case is fascinating because its natural-experiment design is so obvious as well as unique. Imagine starting out with a country, splitting it into a western and an eastern part, isolating the parts even further by building a wall, and treating the eastern part with state socialism; 40 years later, take away the treatment and reunite the country. This is what happened to Germany. Since East Germany is traditionally Protestant, while West Germany is traditionally mixed (Protestant and Catholic), we focus in this article only on disaffiliations from the Protestant church, thus guaranteeing similar starting conditions for the “experiment”.

Our research question can be stated as follows: What effect did the application and removal of the “socialist treatment” have on religious disaffiliations from the Protestant church in East Germany compared to religious disaffiliations in West Germany? More specifically, we investigate whether or not the socialist treatment changed the point in time when disaffiliations started to become a significant social phenomenon, the link between sociodemographic factors and disaffiliations, and the way other external triggers affected

disaffiliations. Additionally, we ask what reasons individuals give for their disaffiliations in West and East Germany. Our analysis combines longitudinal church statistics, a survival analysis (combining 11 Cox regressions) of three waves of the retrospective KMU survey (church member survey of the Evangelical Church Germany – EKD), as well as historical and qualitative accounts by historians and sociologists.

## **2. Theory**

### **2.1 Theorizing disaffiliations**

For our purposes, we define disaffiliation as an act of ending one's formal membership in a religious group (for an overview of definitions and operationalizations see Kasselstrand 2020, Streib et al. 2011). From a rational action perspective, a disaffiliation is a choice between two options – remaining a member or disaffiliating. A rational individual will disaffiliate as soon as the subjective benefit/cost ratio of leaving is higher than of staying (Birkelbach 1999: 137). This ratio may be influenced by dispositional (e.g. gender, religious socialization, values) and contextual factors (e.g. leaving home, tax increase). Research on the way individuals actually leave their religious groups has shown that they are indeed influenced by their dispositions and react – to a certain extent – rationally to cost-benefit changes of church membership in their environment. Thus, tax increases in countries with church tax routinely lead to higher disaffiliation rates, since individuals can thus economize on taxes (Birkelbach 1999: 137, McClendon and Hackett 2014).<sup>3</sup> However, there seem to be two important limits to the rational action model: (1) A number of disaffiliations are clearly emotionally triggered. Church scandals often strongly anger people, leading them to disaffiliate (Berghammer, Zartler, and Krivanek 2018); (2) On the other hand, individuals often remain church members even though they are highly critical of their religious group, never go to church and do not believe, and have to pay important church tax. In other words, church membership seems to

be rather tenacious. One explanation for this fact is that individuals often do not even see the options, since they believe their church membership to be part of their (individual, family, or group) “identity” (De Graaf , Need, and Ultee 2004: 82). They thus remain in a kind of “default” state that can only be shaken by very strong external disruption (Stolz and Chaves 2017). Such limits of rational action can be accommodated by assuming a model of “bounded rationality” (Simon 1983, Klaes and Sent 2005).

## **2.2 Disaffiliation patterns in the west – and in West Germany**

Research has produced a very consistent picture of the patterns of disaffiliations since 1950 in western countries. In what follows, we describe the most important aspects of these patterns. Regarding their timing, religious disaffiliations have been shown to be quite infrequent in most western countries in the 1950s and 1960s and became important only in the late 1960s and early 1970s (Stolz and Ballif 2010, Pollack and Rosta 2017, McLeod 2007).

Clear patterns appear when looking at the sociodemographic profile of disaffiliations. Studies routinely find that disaffiliations are more likely among males, the highly educated, and individuals who live in urban environments. (Vargas 2012, Thiessen and Wilkins-Laflamme 2017, Berghammer, Zartler, and Krivanek 2018). Various mechanisms for these correlates have been proposed, we only mention a selection. Individuals have a higher probability of religious disaffiliation at a young age (roughly between 15 and 25 years of age)<sup>4</sup> because this is the time when they leave home and in general have to make central choices concerning their lives (De Graaf , Need, and Ultee 2004: 84). It is also a time in which they are exposed to high mobility, diversity, and possibly have different partners of different religious or nonreligious background; this diversity may lead them to doubt and put in question their

former taken-for-granted religious beliefs and practices (Uecker, Regnerus, and Vaaler 2007: 1667).<sup>5</sup> Reasons given for the higher disaffiliation probabilities of men are that they have been less strongly religiously socialized during their childhood than women, that they feel less responsible for the religious upbringing of their own children, that they are more often and more closely integrated into the rationalizing structures of work, and even that they might be biologically hard-wired to be more open to risk, less religious, and more open to leaving their religious affiliation (Miller and Stark 2002). Higher education is thought to lead to a higher probability of disaffiliation as it transmits a scientific worldview and critical thinking and may permit individuals to obtain more resources and higher social status which allows to solve some problems in a technical way instead of symbolically-religiously (De Graaf , Need, and Ultee 2004: 89, Albrecht and Heaton 1984).<sup>6</sup> Individuals living in urban areas or moving to such areas may have a higher probability to disaffiliate than individuals living in rural areas, since urban areas are characterized by more religious and secular diversity, lower social control, higher average education and rationalization, all raising the probability of individual disaffiliation (Te Grotenhuis and Scheepers 2001: 603).

Unsurprisingly, individuals in western countries have a higher probability of disaffiliating if they have been weakly or not religiously socialized and if, as a consequence, their religious identity is only weakly developed. Mixed marriages (with partners of different confessions or one partner without confession) are an important factor leading to relatively weak religious socialization (Voas 2003). Individuals who have only weakly been religiously socialized often claim that they have no use for religion or that they are completely indifferent to religion (Stolz et al. 2016).

Disaffiliations are also dependent on context. In western countries, individuals who already have the necessary dispositions mentioned above, are especially likely to disaffiliate when their action is triggered by a context favoring disaffiliations. Typical life-cycle contexts are leaving the parental home, or receiving the first tax bill (raising disaffiliation probability).<sup>7</sup> Socio-historic contexts are specific events or processes in a given socio-historic situation that have a unique influence on disaffiliations, irrespective of one's age or cohort membership. Examples are the counter-cultural movement in the 1960s or specific tax increases in a given year, or church scandals.<sup>8</sup>

Religious disaffiliations in West Germany have been well documented and follow what we have presented as the “western model” almost to the letter (Pollack 2001, Birkelbach 1999). Disaffiliations in West Germany start as a mass phenomenon in the late 1960s, they are especially likely among young urban men who have only been weakly religiously socialized, and they are often triggered by leaving the parental home, and receiving the first tax bill. One thing that is specific to West Germany and different from the situation in many other European countries is that members of Protestant or Catholic churches have to pay a compulsory church tax (8% or 9% of income tax, depending on the Land<sup>9</sup>), that is collected by the state for the churches (Kühn 2014: 64). Individuals who have been baptized into either Protestant or Catholic churches are considered to be church members. To avoid church tax, individuals have to officially declare their disaffiliation in front of a court or by certified letter and have to pay a fee.<sup>10</sup> This means that disaffiliations in West Germany are a particularly clear-cut phenomenon, involving a legal step, and thus differing in this respect from disaffiliations in countries with a stronger differentiation of church and state (such as the US).

Having described the western model of disaffiliation, of which West Germany is an example, we can investigate whether the socialist “treatment” applied to East Germany had important effects on disaffiliations that significantly differed from our West German “control group”.

### **2.3 The German experiment**

Recall how the division of Germany happened (Richter 2009: 11 ff.): After the Second World War, Germany was divided into four occupation zones. France, Britain, and the US united their zones to permit the joint creation of the Federal Republic of Germany (FRG) in 1949. The Soviet Union, however, created a separate, socialist German state in the East: the German Democratic Republic (GDR). This state was politically completely dependent on the Soviet Union. For many individuals, the West German state seemed to be more attractive than the East German state, since it both guaranteed more individual freedom and had more economic success. This is why 3.4 million people migrated from the East to the West in the 1950s (Effner and Heidemeyer 2005: 27f.). As a reaction, in 1961, the East German state prohibited its citizens to emigrate to West Germany and started building “the wall”. More than 25 years later, in 1989, and as a result of decreasing Soviet pressure, possibilities to escape by the Hungarian route, and increasing public protest, the border was opened on the night of the 9<sup>th</sup> of November 1989, and in the following months the East German state disintegrated. On the 3 October 1990, the German reunification took place.

From its very beginning, the East German state (GDR) saw the churches as its ideological enemy. While the constitutions of 1949 and 1968 seemed to guarantee freedom of religion, in fact the regime did much to suppress religious groups and individuals with a religious lifestyle. Among the methods reported were the following (Pollack 1994: 139, 383): (1) administrative obstruction of church activities; (2) spreading of ideological propaganda

against the church; (3) applying pressure on Christian adults to make them disaffiliate from religion and stop religiously socializing their children; (4) applying pressure on children (and their parents) in school and state-organized leisure activities to make them disaffiliate and discontinue religious instruction; an effective tool in this respect was to hinder children from entering higher education if they did not disaffiliate.

It is important to note that the enforcing of church tax by the churches was at first hindered by the state, and then church tax was abolished in 1956. The Protestant churches therefore had to ask their members for a financial contribution on their own – but could not enforce their claims with the help of the state. Also, the state did not officially keep a list of church members anymore, and a disaffiliation did not have to be announced to the state. These measures had the effect that the act of disaffiliation became less clear-cut, from a legal point of view, than in West Germany.

According to historians, the anti-religious activities had a peak in 1952/53 and 1958 and continued at a reduced level in the 1960s, but became much less important in the 1970s and 1980s (Döhnert 2000, Richter 2009). All in all, the anti-religious measures of the regime had an astonishing success: 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).

## **2.4 Hypotheses**

To focus our analyses, we distilled our expectations as to what effects the state socialist treatment should have in East Germany into four hypotheses. As we have seen, the East German regime started out with strong pressure on individuals to disaffiliate, especially in the



1950s and 1960s. From this, we would expect that disaffiliation rates in East Germany should be higher in these decades than in West Germany:

H1: Disaffiliations in East Germany start already in the 1950s and are much higher in the 1950s and 1960s than in West Germany.

While regime pressure is external, it seems sensible to assume that sociodemographic dispositions like gender, education and urbanity should work independently of the regime in similar ways in West and East Germany<sup>11</sup>. This leads to:

H2: Individuals who are male, highly educated, and living in an urban environment have a higher probability of disaffiliation both in West and East Germany.

As we have noted above, in West Germany, religious disaffiliations became important especially in the late 1960s and early 1970s. This is normally explained with the countercultural movement and the attempt to economize church tax during the economic (oil) crises.<sup>12</sup> However, one may hypothesize that individuals in East Germany were overall less affected by the counter-cultural movement and also less affected by the oil crisis, because its political and economic isolation protected it from the world-wide recession. (Ebert 1988, Ritschl 1995). This leads to hypothesis:

H3: Other than in West Germany, in East Germany, religious disaffiliations do not rise in the late 1960s and early 1970s.

How could the reunification have affected religious disaffiliations of East Germans differently than West Germans? Interestingly, two contrary hypotheses seem both plausible. One might suspect that religious disaffiliations for East Germans became less probable with the reunification, because all state pressure disappeared and the churches had gained important prestige during the East German protests (H4a). On the other hand, one may hypothesize higher disaffiliation probabilities in East Germany, because church tax that was not compulsory during the GDR (or at least not enforced), became again compulsory with the reunification (for church members). This leads us to the two hypotheses H4a and H4b.

H4a: In 1989 there are less disaffiliations in East than in West Germany (because of new freedom and the role of the churches in the GDR).

H4b: In 1989, there are more disaffiliations in East than in West Germany (because of tax re-imposition).

### **3. Method**

#### **3.1 Data and measures**

Reliable data measuring religion in socialist countries is generally hard to find. In this case, we are lucky to have at our disposal two reliable sources of data that can be triangulated. (1) Church statistics from the Protestant churches in East and West Germany from 1900 to 1989, collected by Pollack (1994) and recently updated by Pollack and Krueggeler (2016). The quality of these statistics differs somewhat according to the Länder, but it is generally quite high (in some cases very high) (Pollack and Krüggeler 2016). We have to acknowledge, however, that the regime pressure in East Germany tried to weaken the churches and that, in

contrast to West Germany, church tax was not enforced by the state. As a result, in West Germany the distinction between a church member and a non-church member remained more salient than in East Germany (compare to Berghammer (2018)).

(2) Three waves of the Kirchenmitgliedschaftsuntersuchung (KMU, translated: church member survey) provided by the Evangelische Kirche Deutschlands (EKD, translated: Evangelical Church Germany): 1992, 2002, and 2012.<sup>13</sup> The KMU is a survey conducted every ten years among members of the Protestant church and individuals without a religion in Germany. Since 1992, the population consists of all individuals living in both West and East Germany of 14 years or older that self-report (1) as a member of the EKD, (2) as none and having formerly belonged to the EKD, or (3) as none and having never belonged to any religious group. The survey uses stratified random sampling.<sup>14</sup> We use weighted data.<sup>15</sup> 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.

Our dependent variables in the KMU dataset are (1) Disaffiliation: a dichotomous item asking whether or not the respondent had disaffiliated from the Protestant church (yes / no); and, (2) Year of disaffiliation: an item that measures in what year that disaffiliation took place. In a survival analysis framework, these two variables are combined, such that the dependent variable becomes the time-to-the event (in our case the disaffiliation), while the

individuals who have not had the event are “censored” (See also the note on Survival Analysis in the Appendix, part 1).

The reasons for disaffiliating were measured as follows. Respondents could give a seven-step answer from “not at all accurate” (1) to “completely accurate (7) to various possible disaffiliation reasons. As a result of a factor analysis, we built three composite scales and left one item unchanged. Three items were used to measure the disaffiliation reason “no belief / indifferent” ( $\alpha = .77$ ). The item wordings were: (1) “because I’m indifferent to the church” ; (2) “because I don’t need the church and its beliefs (“den Glauben”) anymore”; (3) “because I don’t need religion in my life”. Two items were used to measure the disaffiliation reason “anger about the church and pastors” ( $\alpha = .67$ ). The item wordings were: (1) “because I was angry about pastors and/or other church officials”; (2) “because I was angry about official church statements”. Three items were used to measure the disaffiliation reason “state pressure” ( $\alpha = .87$ ). These questions were only asked for individuals in East Germany. The item wordings were: (1) “I was put under political pressure”; (2) “I wanted to avoid unnecessary conflict for me and my children”; (3) “life in the GDR and church membership were not compatible”. One item measured the disaffiliation reason “church tax” with the wording: “I thus economize church tax”.

Our independent variables are:

- East/West. This variable distinguishes individuals having grown up and still living in either West (0) or East (1) Germany.
- Gender. This is a two-step dummy variable male (0), female (1).

- Educational attainment. This is a four-step variable with the levels “still studying”, “secondary school, lower level” (“*Hauptschule*”), “secondary school, intermediate level” (“*Realschule/POS*”), “secondary school, higher level” (“Gymnasium”).
- Urban/rural. This is a five-step variable distinguishing whether respondents lived in a town/city with “up to 5,000”, “5,000-19,999”, “20,000-99,999”, “100,000-499,999”, “500,000+” inhabitants.<sup>16</sup>
- Periods. These are series of dichotomous variables that distinguish 5 later years from 5 former years (with a score of 0 for the former five years and 1 for the 5 later years). In the next section on analytical strategy, we explain in detail why and how we use these multiple period variables.

Note that for reasons of data availability, we are able to include only a small number of the determinants of the “western model” in our analysis. Specifically, our data do not measure variables such as time of leaving household, time of marriage, or religion and religiosity of parents when growing up. Nevertheless, our selection of variables will suffice to prove our central point, namely that a changed context in East Germany led to extremely different aggregate effects in disaffiliations from those in the “western model”.

Table 1 gives descriptive information on our dependent and independent variables.

\*\*\* Table 1 about here \*\*\*

### **3.2 Analytical strategy**

Our analytical strategy is to combine and triangulate the historical record, church statistics, as well as the survival analysis of the KMU data to get the best possible answer to our research

question. Like a number of previous studies, we use survival (or: time-to-event) analysis to analyze religious disaffiliation (Te Grotenhuis and Scheepers 2001, Need and De Graaf 1996, Sherkat 1991). For our purposes, and compared to a logistic regression model, a survival approach has the advantage that the influence of time and the phenomenon of censoring can be taken into account (Mills 2011, Fox and Weisberg 2011).

More specifically, we use Kaplan-Meier plots and a series of Cox regressions. We employed the survival package in R (version 3.6.2) to estimate our models (Thomas and Reyes 2014). We first tried to fit one unique Cox regression model for the whole timeline, but faced the problem that the proportional hazard assumption was not met. In other words, it did not turn out that the hazard rate of disaffiliating remained constant over the forty years (which, upon reflection and considering what happened historically during this period, is not that surprising). We therefore run a series of 11 Cox regressions, in which each only takes into account disaffiliations in a specific 10-year timeframe of the process. In every one of these Cox regressions, a dichotomous period variable distinguishes the 5 later years from the 5 former years and an interaction variable Period x East/West measures whether the period effect differed in East and West. In this way, we “slide” our 10-year observation window over the 60 years of interest. For example, the first Cox regression observes disaffiliations from 1951 to 1960. The period variable distinguishes disaffiliations that happened between 1951-1955 from those that happened between 1956-1960. Sliding our window of observation five years along the timeline, the next Cox regression observes disaffiliations from 1956 to 1965 (the period variable again distinguishing the 5 later and 5 former years of these 10 years). Obviously, the decision to take 10-years intervals is arbitrary, which is why we have conducted extensive robustness checks with different time-intervals. The overall results in such tests remain similar. In all of these regressions, we control for gender, educational

achievement, and city size. We test the proportional hazard assumption for the Cox regression model fit with the function `cox.zph` in R. As a measure of the fit, we use R-squared (Nagelkerke) and the concordance.

## 4. Results

### 4.1 Charting disaffiliations

The results of the application and removal of the “socialist treatment” in East Germany compared to West Germany can in a first step be observed in Figure 1 where we use church statistics to plot the percentage of Protestant members disaffiliating in a given year in West and East Germany.<sup>17</sup> Several points are noteworthy.

\*\*\* Figure 1 about here \*\*\*

(1) First, note how similar the disaffiliation rates in West and East Germany are before 1945, i.e. before our experiment starts. Of course, Germany was not politically divided into a West and East part at that time, but we can classify the Länder in such a way that they represent the later divide.

(2) When our experiment starts, in 1945, we immediately see that disaffiliation rates continue to drop in West Germany, but rise in East Germany. This is the effect of the GDR regime pressure. The form of the curve reflects the historical events extremely well. We see a first relatively sharp rise of disaffiliations in the early 1950s, when the party started its campaign against the youth organization of the Protestant church (the "Junge Gemeinde")<sup>18</sup>, and an even stronger rise in 1958, when the secular rite “Youth consecration” (“Jugendweihe”) was enforced to replace Christian confirmation, bringing Jugendweihe rates up from about 25% to

about 90% (Döhnert 2000). In East Germany, disaffiliation probabilities then slowly decline during the 1970s and 1980s.

(3) Other than in West Germany, in East Germany, religious disaffiliations did not significantly rise in the late 1960s and early 1970s. At this point in time, in West Germany, disaffiliations rise, likely linked to the countercultural movement of the 1960s and to tax raises. Two peaks can be identified and easily linked to tax raises: in 1970, the state introduced an “Economy supplement” (“Konjunkturzuschlag”), and in 1973 a “Stability supplement and Oil supplement” (“Investitionssteuer, Mineralölsteuer”) (Birkelbach 1999: 143). Since West Germany uses a compulsory church tax, individuals who are confronted with sudden general tax raises and who seek to economize on taxes, may do so by officially disaffiliating from their church. In East Germany, we do not find a corresponding rise for three reasons. For one thing, the East German regime was able to shield its citizens quite effectively from the 1960 cultural revolution by controlling the media and the youth culture. Furthermore, oil was imported almost exclusively from Russia, and not the Arab countries which had instigated the crises by limiting oil supply (as a reaction to the Israeli’s winning the 1973 Arab-Israeli war). Finally, while church tax in East Germany was formally still in existence, it was in practice not enforced, meaning that individuals could reduce their church contributions (or not pay at all) and still remain members.

(4) In 1990, as a result of the reunification, disaffiliations rose again both in West and (especially strongly) in East Germany. In West Germany, two peaks can be observed that coincide with general tax raises: The first and second “solidarity supplement” (“Solidaritätszuschlag”). These were tax raises relating to the costs of the reunification<sup>19</sup>; for West Germans, church tax remained constant. For East Germans, however, the situation was very different, as they were faced with churches that re-enforced church tax after a period of laxness. This meant that they had to pay church taxes for the first time after 40 years in hard



currency.<sup>20</sup> Most East Germans had not paid any church tax for years, large numbers had lost whatever faith they had previously had and had officially or subjectively disaffiliated from the church. With the reunification, the churches argued that many of these individuals were in fact still members and had to pay their compulsory church tax (sometimes even retroactively). East Germans who found themselves in this situation were often extremely upset by these claims.<sup>21</sup> Furthermore, the image of the churches changed. After the re-unification they seemed to be institutions that had sided with the “winners of the reunification”, were increasingly identified with the state, and lost their function as rallying points of opposition (Pollack 1994). It is understandable, that under such conditions a wave of disaffiliations swept over East Germany that significantly exceeded the one in West Germany. It has to be noted, though, that the reunification not just led to a massive increase of disaffiliations in East Germany, but also to a notable increase in (re)affiliations (Pollack 2000: 25).<sup>22</sup>

It is important to note that the longitudinal church statistics that we have just analyzed and the retrospective KMU data that will be used for multivariate analyses below show a very similar picture concerning the evolution of disaffiliation processes (see Appendix, part 2). The fact that the overall picture emerging from these very different data sets is so similar considerably strengthens our confidence that we capture the disaffiliation processes correctly.

## **4.2 Cox regressions**

In a next step, and using the retrospective KMU data, we show that our findings hold up when estimating them in multivariate models. We do this by running a series of Cox regressions. (Table 2). As explained above in the method section, Table 2 contains the results from 11 distinct Cox regressions that each span a 10-year “window of observation”. We give out the hazard ratios. Thus, the first regression (model 1) observes disaffiliations from 1951

to 1960 and estimates (1) the effect of the difference between West and East; (2) the effect of the period, that is, whether the later 5 years are significantly different from the former 5 years; (3) the interaction between West-East and period, that is, whether the effect of period was different in West and East. The second regression (model 2) slides the window of observation 5 years ahead, looking at disaffiliations between 1956 and 1965, and the period variable again compares the 5 former and the 5 later years. All models control for sex, education, and urban/rural.

It would be tedious to go through the specific results of every one of the 11 models; instead we focus on the general lessons we can learn when looking at the models in a comprehensive way. Five points stand out.

(1) From 1951 to 1970 (models 1 to 3), we find that the odds of disaffiliations are more than 10 times higher in East Germany than in West Germany. This is clear evidence for a regime pressure effect. The large difference starts to fall already in the 1960s and then disappears in the 1970s. In fact, the odds of disaffiliation are only 2.14 times higher in East Germany in 1971-1980 (model 5) and there is no significant difference anymore in 1976-1985 (model 6).

(2) In 1961-1970 we find a strong and highly significant interaction in model 3 (0.26\*\*).

Together with the strong period effect (3.08), this means that in the latter five years of the ten-year period, disaffiliations rose in West Germany. In other words, these coefficients capture the strong rise of disaffiliations in West Germany in the late 1960s that we observed above.

(3) There is equally clear evidence of the reunification effect. In 1981-1990 we see a significant period effect (in the later 5 years there are 1.51 more disaffiliations than in the former 5 years both in East and West Germany). This period effect is, however, has to be seen together with the interaction (West-East \* period) showing that the rise is 2.30 times stronger in the East than in the West. The main West East effect (.64) shows that

disaffiliations in general are somewhat less high in the East than in the West in the overall period between 1981-1990 (holding the other effects constant). The interaction effect 0.42 in model 8 shows that disaffiliations in East Germany fall just as quickly as they rose around 1990. In sum, these coefficients capture what we saw in the graphs. A rise in disaffiliations as a result of the reunification – which was especially strong in East Germany.

(4) In the period 2001-2010, we again see a significant rise in disaffiliations, which is particularly pronounced in the East, although starting from a relatively low level. This fits with what we see graphically (see Appendix, part 2), but we do not have a ready explanation for this very recent renewal of disaffiliations.

(5) The effects of sex, education, and urban rural are as expected: individuals who are male, higher educated, and who live in an urban environment have slightly higher odds of disaffiliating. However, these effects are not very important and not always significant. There is one interesting fact about education that does not show up in these models, however. We will come back to this below.<sup>23</sup>

Overall, the Cox regressions show that the effects we observed graphically – the strong state socialist repression, the rise of disaffiliations in the West in the late 1960s and the reunification effect – are significant.

\*\*\* Table 2 about here \*\*\*

### **4.3 The education-disaffiliation link**

One important point cannot be shown with our Cox models (because of estimation problems). It shows up, however, when we plot Kaplan-Meier curves of disaffiliation probability over time by educational achievement in West and East Germany (Figure 2).<sup>24</sup> In the West, we see

the expected relationship: individuals with higher educational attainment have a higher probability of disaffiliating. In the East, however, we see that individuals with the lowest educational attainment (“Hauptschule” = secondary education, lower level) disaffiliated much earlier and at a significantly higher rate than the two higher levels. For example, and as Figure 2 shows, shortly after 1970 already 20% of lower education individuals in our dataset had already disaffiliated, against only about 10% of the medium and higher education individuals. One explanation for this is that the GDR started out as a state of the “workers and peasants”. Especially in the first two decades, this created upward mobility opportunities for individuals with less education if the individual showed itself worthy in the eyes of the regime – for example, by disaffiliating (Richter 2009: 27, 34). These new opportunities were heightened by the fact that individuals with higher educational prestige emigrated with higher probability in the first years of the GDR, thus creating open positions for possible upward mobility for individuals who would not have climbed the social ladder without such a regime change. Another explanation has to do with the well-known mechanism of the more independent mindset of higher educated people (labelled as cognitive mobilization of an increasing part of the population after WWII by Inglehart (1977)). Higher educated may think more independently and may therefore had – at least initially – a higher resistance when facing regime pressure.

\*\*\* Figure 2 about here \*\*\*

#### **4.4 Reasons for disaffiliations**

What subjective reasons do individuals give for their church disaffiliations? In Figure 3 we have plotted four types of reasons according to decade of the disaffiliation in West and East Germany. Four points stand out.

(1) In West Germany, we see a fairly constant picture. From the 1970s on, “saving church tax” seems to have been the most important disaffiliation reason, followed by “lack of belief/indifference”, and “anger about church/pastor”. In the West German questionnaire, the reason “state pressure/difficulties” was not an option given to respondents. In East Germany, the picture is much more dynamic over time. While “no longer believe/indifference” is a consistently high and relatively stable disaffiliation motive, “anger about church/pastor” is stable and less often stated. Interestingly, “save church tax” rises over time, while “state pressure/difficulties” drops over time as disaffiliation motive in the East.

(2) The development of “state pressure/difficulties” in East Germany is noteworthy. As expected, the importance of this disaffiliation motive is highest in the earlier years of the GDR and declines towards its end. However, one might have expected that respondents would give much more importance to state pressure than they do, especially in the 1950s. Both the historical record and church statistics give us overwhelming evidence of the importance of state pressure, why then do individuals retrospectively do not more often acknowledge this influence? Different possibilities come to mind. It may be that respondents try to avoid appearing as someone who would bow to state pressure and thus downplay the pressure that they actually perceived as such at the time. Preference falsification is a well-known phenomenon (Kuran 1995). Another possibility is that they interpreted their succumbing to state pressure already as their own decision (Wohlrab-Sahr 2011).<sup>25</sup>

(3) “Saving church tax” is a reason that was for the most time more important in the West than in the East, however, it rises in East Germany over time. This makes perfect sense, for the reasons linked to church tax given above.

(4) Why is “anger about church/pastor” consistently higher in West Germany than in East Germany? Historical evidence suggests that the reason lies in the fact that the churches in the West were seen as socially supported authorities that lent themselves well to feelings of

anger; the churches in the East, however, were seen as being on the side of the (powerless) people (Pollack 1994).

\*\*\* Figure 3 about here \*\*\*

## 5. Discussion

Using the separation of Germany between 1949 and 1989 as a natural experiment, this paper has argued that specific strong changes in a social context may lead (bounded) rational individuals to disaffiliate at a much higher rate and consequently create very different aggregate outcomes compared to those that are routinely observed in western countries. More specifically, we asked what effect the application and removal of the “socialist treatment” had on disaffiliations from the Protestant church in East Germany compared to West Germany. To focus our analysis, we condensed our expectations in a number of hypotheses that have led to the following results.

- (1) We find that disaffiliations as a mass phenomenon started already in the 1950s in East Germany as a result of regime pressure (confirmation of hypothesis 1). Disaffiliation probabilities are up to 10 times higher in East than in West Germany (where disaffiliations were still negligible) in the the 1950s and early 1960s .
- (2) The associations with gender and the urban-rural difference are similar in West and East Germany (see in the Appendix, part 3), but education seems to play a different role: In the East, individuals with low education (only “*Hauptschulabschluss*”) disaffiliated significantly earlier than other educational groups. All in all, hypothesis 2 is partly confirmed.
- (3) Other than in West Germany, in East Germany, religious disaffiliations did not rise in the late 1960s and early 1970s (confirmation of hypothesis 3). As expected, the explanation lies

in the fact that the East German regime was able to quite effectively shield its citizens from the countercultural movement and was effectively untouched by the oil crises.

(4) The reunification led not to a drop, but an important rise of disaffiliations in East Germany (rejection of hypothesis 4a and confirmation of hypothesis 4b). While one might also have expected an opposite effect (less disaffiliations in East Germany because of the removal of an atheist regime, the positive image of the churches who had criticized the regime, as well as the new religious freedom), this was not the case. What happened was that East Germans had a double incentive to disaffiliate. On the one hand, taxes were raised for both West and East Germans to pay for the costs of the reunification (first and second solidarity supplement). On the other hand, East Germans were faced with churches who re-imposed church tax on them. Many East Germans whose financial reserves had been devalued and who had lost their link to the churches completely disaffiliated as a result of these events. This having been said, there is also evidence showing that (re-)affiliations rose temporarily right after the reunification.

Our findings are a contribution both for the research on the German case and for the general literature on religious disaffiliations.

Regarding the literature comparing religion in West and East Germany (Froese and Pfaff 2005, Hardy, Skirbekk, and Stonawski 2019, Lois 2011a, b, Pickel 2003), our analysis offers the first in-depth comparison and statistical modelling of disaffiliation rates and disaffiliation motives in East- and West Germany. More specifically, we present the first estimations of the effects of different determinants in different time periods.

Regarding the larger discussion on religious disaffiliations, our study adds two points. First, the in-depth analysis of the East German case shows the extent to which the relationships routinely found can be disrupted under changed conditions. In other words, the “western model” of religious disaffiliation is only a special case, depending on specific conditions in secularizing western countries. When important societal parameters are changed, as happened in East Germany, disaffiliation motives, disaffiliation rates, and the influence of socio-structural variables on disaffiliations may dramatically change. As our example shows, state repression and changes in the church tax regime may have a tremendous impact on disaffiliations. Second, for all the differences in how religious disaffiliations worked in West- and East Germany, an overall model of the individual decision may apply to both situations. In this model, the individual has certain dispositions that make a religious disaffiliation more likely – then, a trigger pushes the individual into action. This model would not work without some rationality assumption, and the German case shows that individuals indeed seem to have reacted in what can be seen as a rational way to both state pressure and tax raises. However, our example also shows that the rational core is bounded by various both intra- and extra-personal structures. This has become clear when we saw that individuals gave loss of belief in God or anger as reasons for disaffiliation, or when they minimized evident state pressure as a disaffiliation reason.

Our study has evidently constraints that mainly reside in data limitations. (1) Our KMU data do not permit to test a whole series of interesting questions, especially because important contextual factors and life-events that could also be linked to religious disaffiliation, have not been measured. (2) Furthermore, our KMU data are retrospective; various biases are possible in the question of when and for what reason a person has disaffiliated many years ago. However, we were able to show an overall convergence of results of longitudinal church statistics and retrospective survey data.<sup>26</sup>



An obvious question that arises is why state socialist pressure has had such a big impact on religious disaffiliations in East Germany and not in other socialist countries such as Poland, Hungary, Romania, or Croatia (Pickel 2003). Before answering this question, it is important to acknowledge that East Germany is not a unique case. In some other socialist countries, big drops in church membership have also been observed (Russia, Estonia, and the Czech Republic) (Froese 2004).<sup>27</sup> But it remains true that the state has been particularly successful in East Germany, especially when compared to countries such as Poland or Hungary. Relying on our background knowledge and the relevant literature, we give five tentative reasons for this (Pollack 1994, Richter 2009, Pickel 2003, Ritschl 1995)<sup>28</sup>: (1) East Germans were mainly Protestants, and history has shown that church bonds are weaker among Protestants compared to Catholics or members of Orthodox churches; (2) In East Germany, this was, after the Nazi crackdown on religion, already the second assault on religion, which was not the case in other state socialist countries; (3) the East German regime was relatively successful economically, at least in comparison to other state socialist countries at the time; they therefore had a higher legitimacy when combating the churches; (4) the East German regime used a slow, rational, piecemeal tactics against the churches, that avoided making martyrs and counter-rallying. This proved more effective than the less focused and erratic crackdown in, say, Poland; (5) because of the heritage of national socialism, churches in East Germany could not re-activate national sentiments against the Communist regime in contrast to churches in other socialist countries. While there are comparable examples for the socialist state pressure effect in other countries, we believe that the reunification effect on disaffiliations in East Germany is unique – no comparable example of another country or region having experienced something similar comes to mind.

One possible critique of our study might be to say that its results are obvious. Wasn't it to be expected that a change in societal context would affect the disaffiliation model? Not necessarily. The politico-juridical regimes regulating religion in western countries can be very different (say, comparing France, Germany, and the UK), and yet the determinants of religious disaffiliation are surprisingly similar. It is therefore not a priori clear that a regime change also affects religious disaffiliations. Furthermore, some influential recent publications in the sociology of religion, Voas (2009, 2008) and Brauer (2018) have argued that all western and central European countries as well as the US undergo the same secular transition, albeit at different moments in time, independently of any change of policy, politico-juridical regimes, or state ideology. It is therefore not trivial to show that and how societal context strongly affects the way religious disaffiliations happen. In fact, in a companion article to this paper (Ref. anonymous), we have shown that the East German state was able to create an “accelerated secular transition” that was not only faster, but also different in form and substance than the western model. In this publication we have added an in-depth analysis of what this accelerated secular transition did to disaffiliations.

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<sup>1</sup> In an earlier paper (ref. anonymous), we show that East Germany represents an "accelerated secular transition" and is a clear counter example to the idea that all European countries are on the same secularization trajectory as suggested by Voas (2009) and Brauer

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(2018), thus lending support to Martin's (1978) intuition that secularization can be strongly influenced by historical context .

<sup>2</sup> Many scholars have argued that the 1960s, with its emphasis on an alternative, countercultural way of living (the Hippies, the critique of authority, etc.) created a religious crisis and led to a wave of disaffiliations from organized religion. See for example McLeod (2007), Putnam and Campbell (2010). We use the label "western" as a shorthand to refer to the countries of western and central Europe, the US, Canada, Australia, and New Zealand.

<sup>3</sup> A church tax may be defined as a compulsory or voluntary tax imposed by the state on members of a religious group in order to finance that religious group.

<sup>4</sup> Berghammer et al. (2018), however, report disaffiliations also later in life for Austria.

<sup>5</sup> Young people may also have a high probability of engaging in behaviour that stands in conflict with the teachings and expectations of the churches (e.g. binge drinking, drug use, nonmarital sex) and may want to resolve the resulting cognitive dissonance by disaffiliating (Uecker, Regnerus, and Vaaler 2007: 1670). Furthermore, young people start their professional careers and have to pay taxes for the first time. Individuals living in countries with a church tax system understand for the first time that their church membership has a cost that can be avoided by disaffiliating (Birkelbach 1999, Kühn 2014).

<sup>6</sup> On the other hand, higher education may lead to a higher propensity of identifying with existing norms and if church membership is among those norms, disaffiliation may be less prevalent among the highly educated. While most studies show higher disaffiliation rates among the highly educated, contrary findings are also reported (Uecker, Regnerus, and Vaaler 2007: 1667).

<sup>7</sup> There are, however, also life cycle factors that typically lead to *lower* disaffiliation probabilities. Examples are marrying a religious partner, or becoming a parent.

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<sup>8</sup> An example that seems specific for the US and is not reported for other western countries is the right-wing fusion of politics and religion in the US in the 1980s (“moral majority”) (Hout and Fischer 2014, 2002), Berghammer et al. (2018: 515) report that 86’000 Catholics (1.6%) left the Catholic church in Austria in 2010, as a result of the disclosure of abuses in Catholic institutions. These period effect triggers are obviously strongly context dependent. Thus, disaffiliations because of a liberal backlash against the success of right-wing, religion-infused politics of the 1980s are only reported in the US, while no such phenomenon has been observed in Europe. On the other hand, tax raise triggers are reported only in countries where a church tax system is in operation (and not, for example, in the US) (Kühn 2014: 307).

<sup>9</sup> Germany is administratively divided into 16 Länder (singular: Land) – the equivalent of the US States.

<sup>10</sup> See Petersen (2020). Die Kirchensteuer – Eine kurze Information <http://www.steuerforum-kirche.de/kist2014.html> (accessed 24 February 2020).

<sup>11</sup> We cannot test for differences in age of disaffiliation between East and West. It is very probable that during the height of the East German regime pressure in the late 1950s, not just young people disaffiliated and that the mean disaffiliation age was therefore higher in the East than in the West at that time. However, even if this were true, we cannot show it with our retrospective data, because those older disaffiliated individuals are not in our samples of 1992, 2002, 2012 anymore.

<sup>12</sup> There are indications that some elements of 1968 were also given in socialist countries. In Czechoslovakia, there was a whole revolt against the regime – that was then crushed by Russian tanks. In the GDR, the effects of the 1960s movement were in comparison to the West extremely weak. See Wolle (2008).

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<sup>13</sup> Data can be ordered at <https://www.gesis.org/home>.

<sup>14</sup> For details see Engelhardt (1997), Huber, Friedrich, and Steinacker (2006), EKD (2014).

<sup>15</sup> 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.

<sup>16</sup> Our urban/rural variable is measured at the time of the survey and can only be a proxy for the probable urban/rural setting during the disaffiliation. We tried to get some independent sense of how stable this variable is in West and East Germany with data from the Socio Economic Panel (SOEP), where we can correlate self-reported living in an urban-rural setting as a child and as an adult. We found that people in the GDR moved less often between urban/rural settings than in the FRG ( $r = .38$  in the East,  $r = .18$  in the West for respondents in 1991). This can be explained by the fact that there was a shortage of flats and both flats and work places had to be applied for at the state administration in the GDR.

<sup>17</sup> There are no solid numbers for Catholic disaffiliations during the period of existence of the GDR, which is why the comparison in our Figure has to stick to Protestant disaffiliations. During the period of the German Reich, in West Germany, and after the reunification, when the comparison is possible, we find that Protestant and Catholic disaffiliations show an extremely similar trajectory over time, the Catholic numbers always being a bit lower than the Protestant ones. See Pollack/Rosta (2017: 77).

<sup>18</sup> The pressure was officially started at the second conference of the party in July 1952 (Pollack 1994).

<sup>19</sup> See Solidaritätszuschlag. <https://de.wikipedia.org/wiki/Solidarittszuschlag> (accessed 24.02.2020 and [https://www.gesetze-im-internet.de/solzg\\_1995/\\_4.html](https://www.gesetze-im-internet.de/solzg_1995/_4.html) (accessed 24.02.2020).



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<sup>20</sup> In the GDR, individuals often did not have a lack of money – but they just could not buy anything useful for lack of goods. This changed with the reunification.

<sup>21</sup> Kirche. Hilfreiche Hand. Auch bei ostdeutschen Christen wird das Finanzamt künftig Kirchensteuern kassieren. Doch niemand in der DDR weiß, wie das geht. Der Spiegel, 13.08.1990. <https://www.spiegel.de/spiegel/print/d-13500357.html> (accessed 18.11.2019).

Kirchensteuer. Frei von Zwang. Vom 1. Januar an müssen ostdeutsche Christen Kirchensteuern zahlen. Wer aber ist steuerpflichtig? Der Spiegel, 17.09.1990 <http://www.spiegel.de/spiegel/print/d-13502107.html> (accessed 18.11.2019).

<sup>22</sup> According to Pollack (2000: 26) the number of (re)affiliations in East Germany amounted to 4752 in 1970, 6848 in 1989, and rose to 23980 in 1991, only to subside again in the following years. The number of disaffiliations, however, reached 82'761 in 1991 and even 106'850 in 1992.

<sup>23</sup> We tried to show the inversed education effect in East Germany in these Cox regressions, but encounter estimation problems.

<sup>24</sup> Kaplan-Meier curves give the percentage of subjects to which a certain event has not (yet) happened up to a certain point in time (Harrell 2001: 409, Mills 2011: 73). They also allow for “censored” observations that for whatever reason fall out of the analysis at a certain point in time, conditional on sex, education and urbanization.

<sup>25</sup> The qualitative, intergenerational, work by Wohlrab-Sahr, Karstein, and Schmidt-Lux (2011, 2009) is very instructive in this regard. The authors show that the GDR state indeed forced secularism onto individuals by putting them into situations where they had to decide between the state and religion. However, once individuals had made their decision (most often: for the state), they then rationalized these decisions and internalized the atheist and

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critical beliefs as their own. This is one way to explain why in our quantitative data “state pressure” as a reason of disaffiliation is not as important as we might have expected.

<sup>26</sup> Reviewers questioned whether reaffiliations might be a problem for our analysis that only focuses on disaffiliations. This would be the case if there were notable cases of people who disaffiliate and then reaffiliate etc. However, there are reliable data showing that this was not the case. Except for the “bump in re-affiliations” right after the reunification, affiliations or re-affiliations are rare both in West and East Germany (Pollack and Rosta, 2017: p. 241).

<sup>27</sup> For Estonia see: [https://en.wikipedia.org/wiki/Religion\\_in\\_Estonia](https://en.wikipedia.org/wiki/Religion_in_Estonia) (accessed 21.11.2019); for the Czech Republic see [https://en.wikipedia.org/wiki/Religion\\_in\\_the\\_Czech\\_Republic](https://en.wikipedia.org/wiki/Religion_in_the_Czech_Republic) (accessed 21.11.2019).

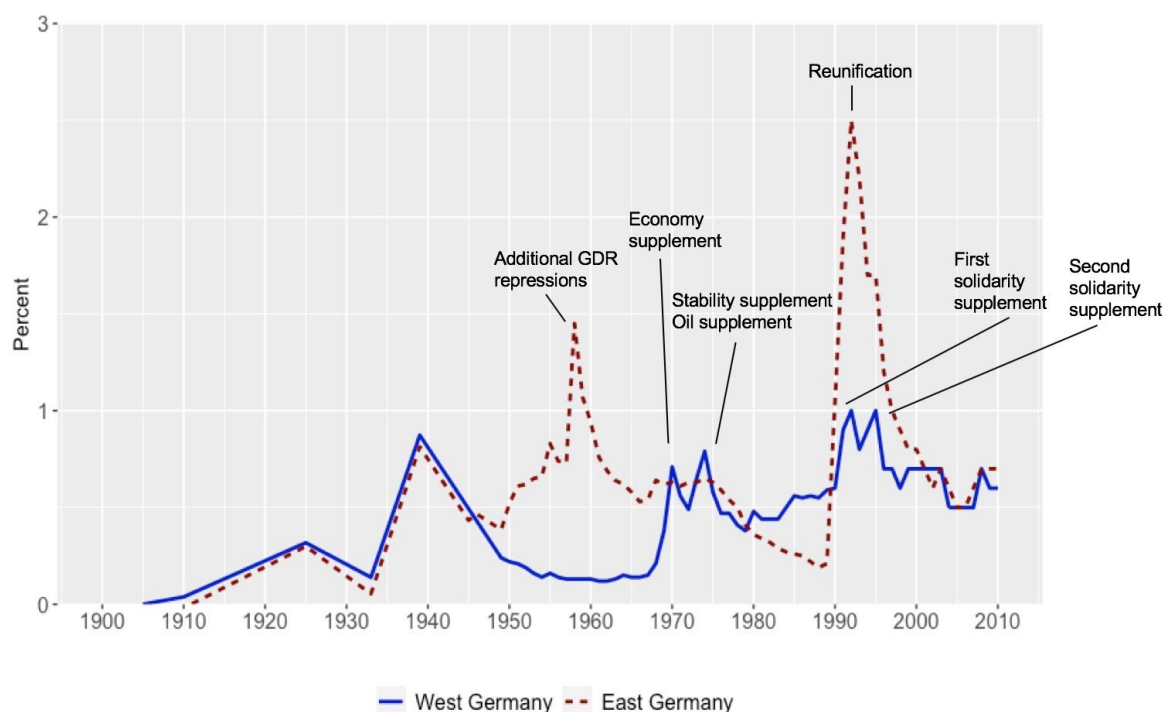
<sup>28</sup> Obviously, these reasons are post-hoc interpretations and are not themselves tested by our model.

Table 1 Descriptive information

Variable	West Germany		East Germany	
	Mean	sd	Mean	sd
Protestant	.77	.42	.25	.43
Disaffiliated (formerly Protestant)	.17	.38	.27	.44
Never had a religion	.06	.23	.48	.50
Year of disaffiliation	1989.5	13.1	1978.7	18.3
Year of birth (- 1900)	55.15	19.41	57.08	18.52
Education (Range 1-4)	2.77	.84	2.95	.74
Urban-rural (Range 1-5)	3.74	1.31	3.13	1.40
Gender	.50	.50	.51	.50
Wave	N	%	N	%
1992	1935	31.8%	874	35.3%
2002	2046	33.7%	838	33.8%
2012	2096	34.5%	765	30.9%
N	6077	100.0%	2602	100%

Note: Weighted data; individuals growing up on other part of Germany excluded; Total N = 8554

Figure 1 Protestant Disaffiliations in West and East Germany, 1905-2010, annotated (church statistics)



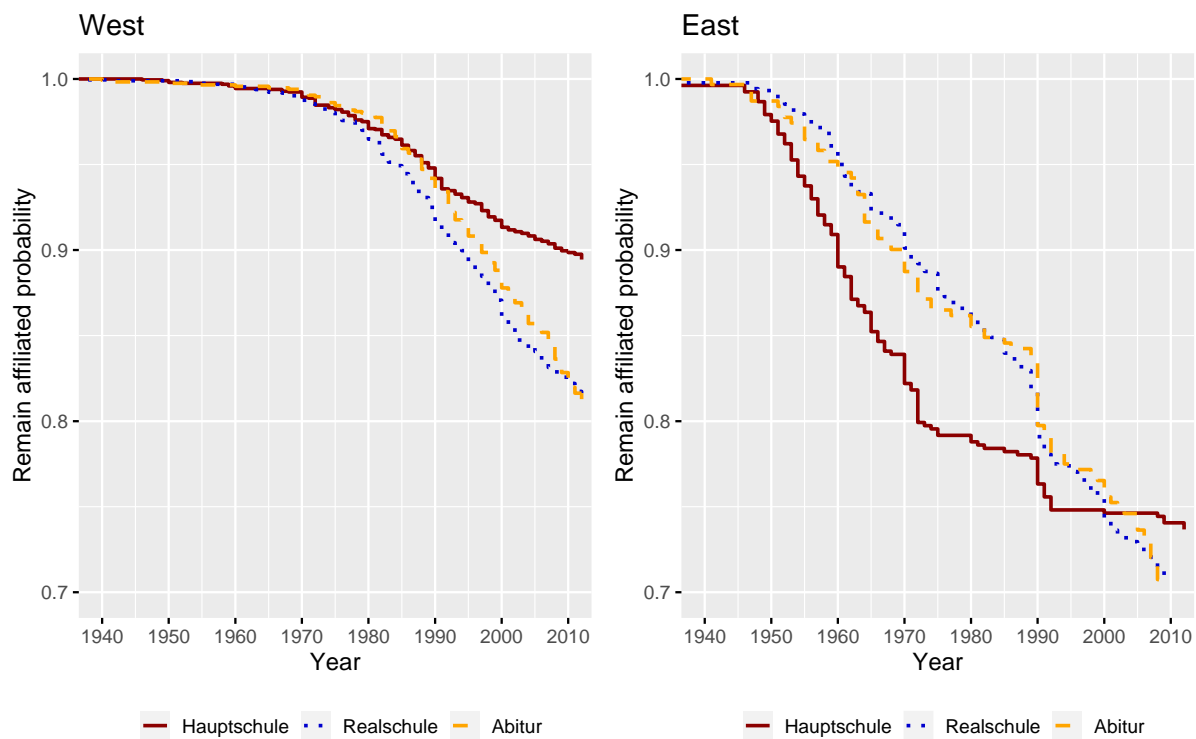
Note: Rate of disaffiliation is calculated as number of Protestant disaffiliations divided by number of Protestants. Data from Pollack (1994: Anhang Tabelle 2), Pollack and Rosta (2017: 77).

Table 2 Disaffiliations in West and East Germany, 1951-2010, church statistics and KMU data (hazard ratio's)

Model <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11
	1951-1960	1956-1965	1961-1970	1966-1975	1971-1980	1976-1985	1981-1990	1986-1995	1991-2000	1996-2005	2001-2010
East <sup>b</sup>	13.58**	10.34**	12.26**	3.77**	2.14**	0.95	.64*	1.38*	0.80	.67*	.61*
Period <sup>c</sup>	1.65	0.86	3.08**	1.62(*)	1.13	1.67**	1.50**	1.11	1.67**	.97	1.60**
West-East x Period	0.75	1.10	0.26**	0.59	0.42	0.63	2.30**	0.42**	0.83	.96	2.21*
Sex	0.64*	0.82	1.06	0.97	0.82	0.73*	0.78*	0.84	0.80*	.75	.82*
Education	1.26(*)	1.29*	1.31(*)	1.16	1.06	1.22(*)	1.20*	1.08	1.04	1.08	1.16
Urban	1.14(*)	1.00	0.90(*)	0.95	1.05	1.14*	1.10*	1.04	1.06	1.11	1.06
Fit (Cox) <sup>d</sup>	.41	- <sup>e</sup>	.81	.39	.57	.83	.04	.01	.18	.08	.06
Concordance	.793	.787	.761	.663	.589	.608	.622	.560	.593	.579	.622
R-square (Nagelkerke)	0.091	0.087	0.069	0.026	0.008	0.011	0.014	0.004	0.001	0.006	0.014
N (indiv.)	4155	4907	5573	6091	6790	7204	7483	7776	7783	5220	5051
N (events)	108	130	128	151	159	176	296	326	293	259	233

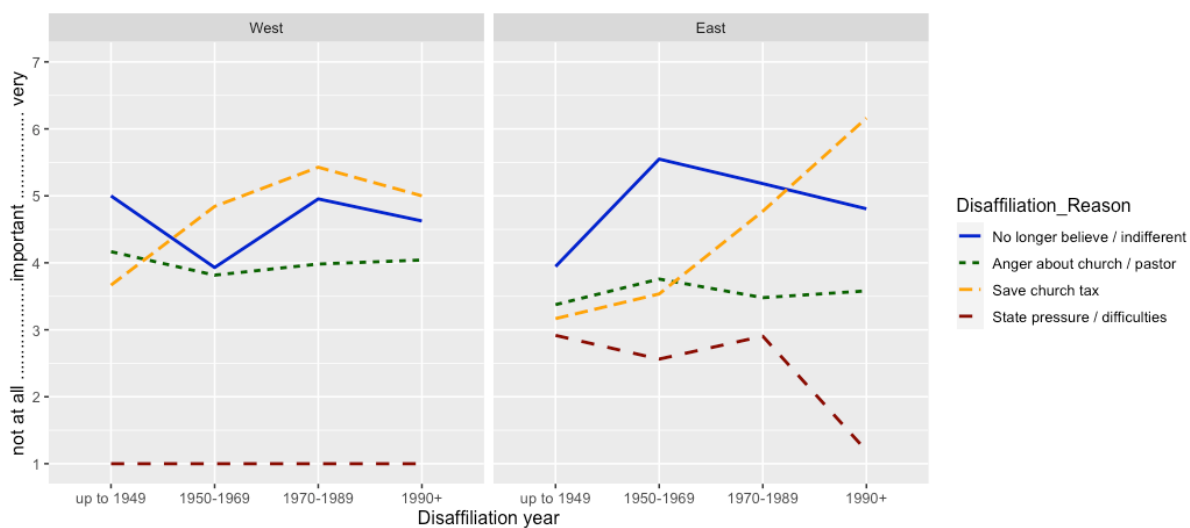
Notes: (a) Every model shows the results of a different Cox regression, observing a specific 10-year time window; (b) East (1) vs. West (0); (c) Period is coded (1) for the latter five years and (0) for the former five years in the 10-year period observed in this model; (d) calculated with the function `cox.zph` in R; (e) not calculated due to an estimation problem; (\*) = significant on the .10 level; \* = significant on the .05 level; \*\* = significant on the .01 level. This graph starts with the year 1951, since the n for the previous decade is too small to allow a meaningful analysis.

Figure 2 Kaplan-Meier plots: Probability of remaining affiliated to the Protestant church in West and East Germany, 1949-2010, according to educational attainment



Notes: Hauptschule = secondary education, lower level; Realschule = secondary education, intermediate level; Abitur = secondary education, higher level. **Individuals who were still studying are excluded.**

Figure 3 Reasons for disaffiliation in West and East Germany according to disaffiliation decade, **1940 - 2000**



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## Appendix

### Losing my religion as a natural experiment: How state pressure and taxes led to church disaffiliations between 1949 and 2010 in Germany

Jörg Stolz, Detlef Pollack, Nan Dirk De Graaf, Jean-Philippe Antonietti  
Version 17.8.2020

#### 1. A note on survival analysis and Cox regression

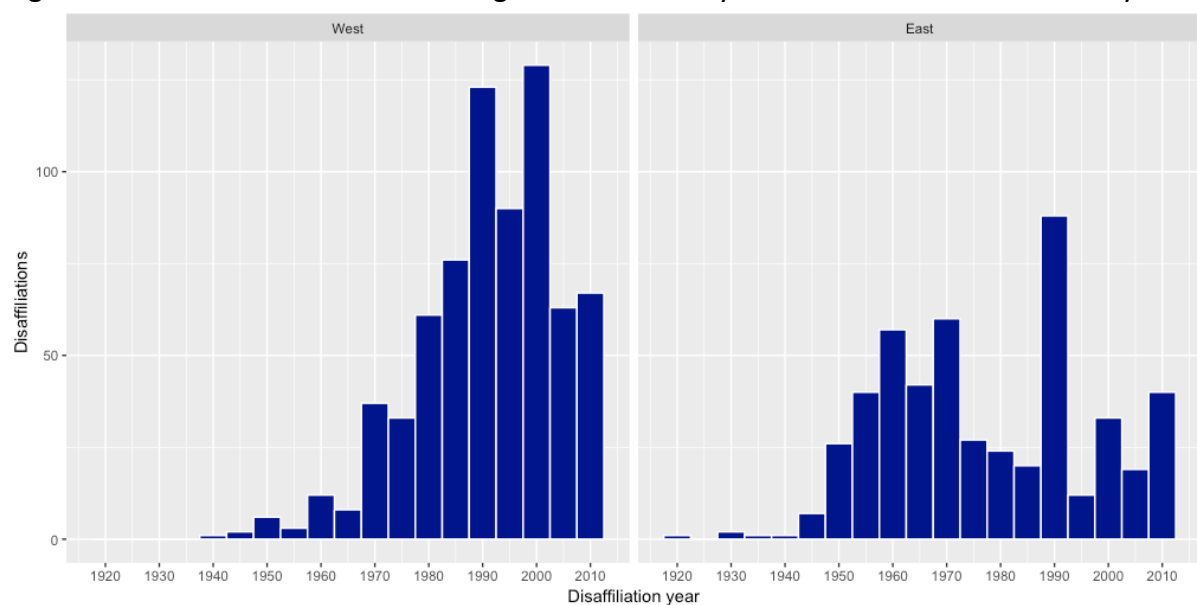
Survival analysis is a type of statistical analysis that analyzes the expected duration of time until a specific event happens (Allison, 2014; Fox & Weisberg, 2011; Harrell, 2001; Mills, 2011; Therneau & Grambsch, 2000). All kinds of events may be analyzed in this way: death, marriage, failure, affiliation or – in our case – disaffiliation. Survival analysis is also called Event-history analysis in sociology. Survival analysis uses what may be called time-to-event data. For every unit of observation, a time up to an end point is recorded – as well as whether or not at that point the event took place. Survival analysis is in some cases superior than logistic regression because it is (a) able to incorporate time information; and (b) can

handle censored data. Censored data is missing data for reasons such as (a) the study is terminated before the unit of observation has been able to experience the event (e.g. the person still lives, has not yet disaffiliated); (b) the unit of observation drops out of the study during the time of observation. Survival analysis can in principle accommodate repeated and non-repeated, as well as single and multiple events. There are nonparametric, semi-parametric, and parametric approaches, and time may be seen as discrete or continuous. The Cox regression used in our analysis is semi-parametric and treats time as continuous. As Allison writes (2014, p. 3), Cox regression "is parametric insofar as it specifies a regression model with a specific functional form; it is nonparametric insofar as it does not specify the exact form of the distribution of event times."

## 2. Comparing disaffiliations according to church statistics and retrospective data

Comparing Figure A1 (based on retrospective data) to Figure 1 in the main text (based on church statistics), we see that the overall picture is very similar. This lends credibility to our retrospective dataset.

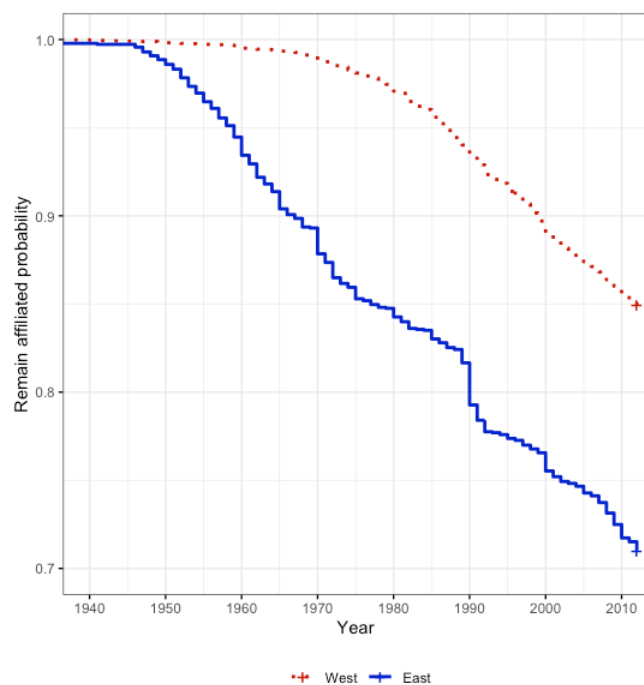
Figure A1 Disaffiliations according to disaffiliation year in West- and East Germany



Source: KMU data.

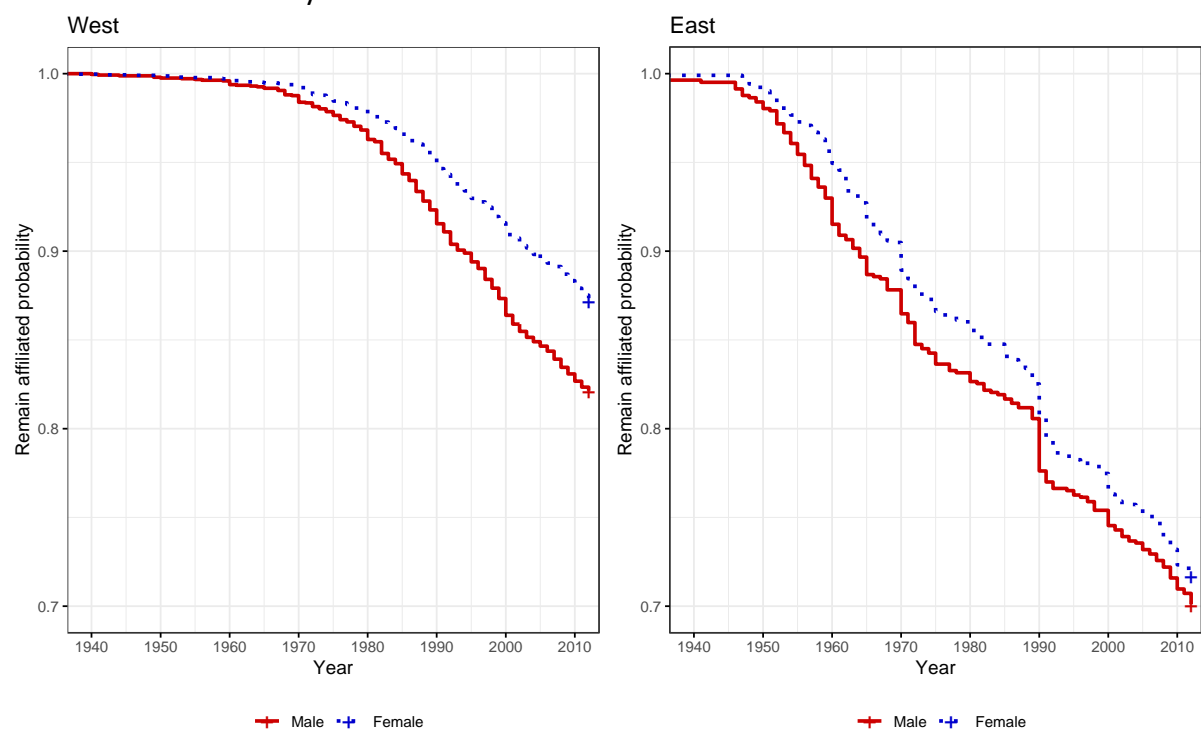
## 3. Additional Kaplan-Meier plots

Figure A2 Kaplan-Meier plot for disaffiliations in West- and East Germany



Source: KMU data.

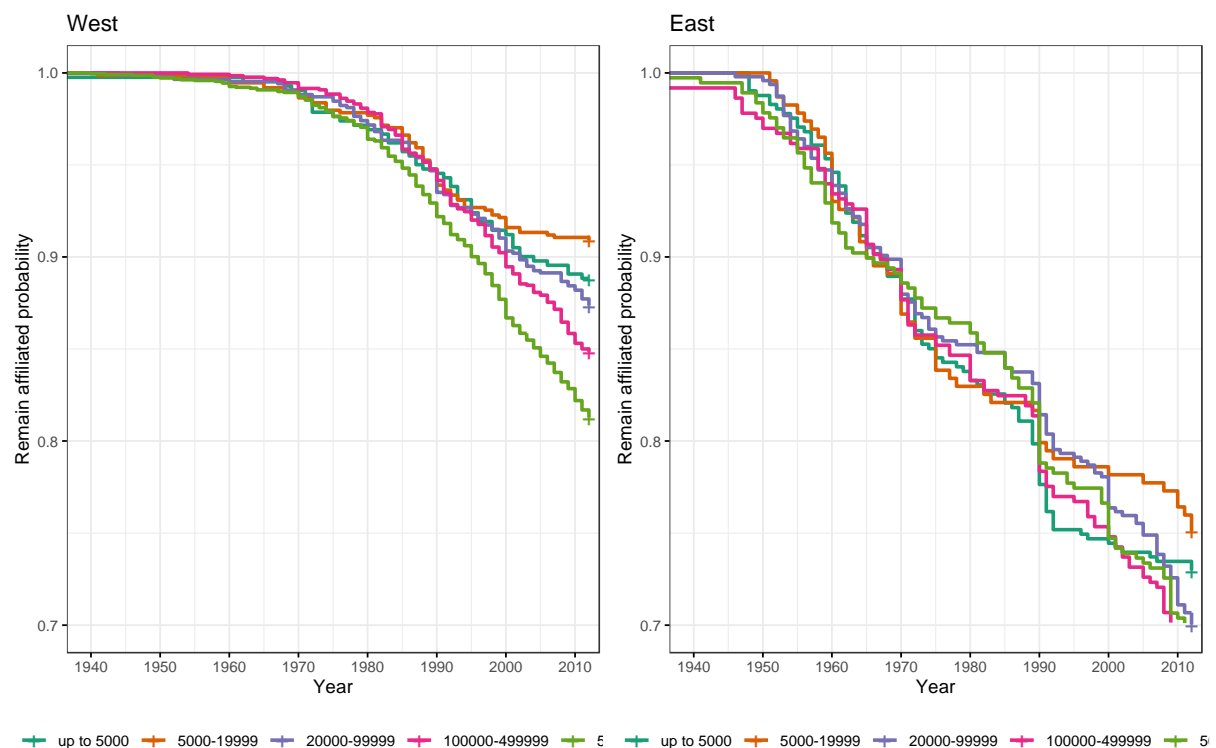
Figure A3      Kaplan-Meier plot for disaffiliations according to sex in West- and East Germany



Source: KMU data.



Figure A4 Kaplan-Meier plot for disaffiliations according to urban-rural in West- and East Germany



Source: KMU data.

## References

- Allison, P. D. (2014). *Event History and Survival Analysis. Second Edition*. London: Sage.
- Fox, J., & Weisberg, S. (2011). Cox Proportional-Hazards Regression for Survival Data in R. An Appendix to an R Companion to Applied Regression, Second Edition.  
<https://socserv.socsci.mcmaster.ca/jfox/Books/Companion/appendix/Appendix-Cox-Regression.pdf>.
- Harrell, F. (2001). *Regression Modeling Strategies. With Applications to Linear Models, Logistic Regression, and Survival Analysis*: Springer.
- Mills, M. (2011). *Introducing Survival Analysis and Event History Analysis*. London: Sage.
- Therneau, T. M., & Grambsch, P. M. (2000). *Modeling Survival Data. Extending the Cox Model*. New York: Springer.