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Religion in contemporary Germany is marked by institutionalized outreach as well as increased pluralisation. Religion can thus play a decisive role in fertility behaviour, despite of secularizing tendencies. Religion may influence the debut and frequency of sexual activity, contraceptive behaviour, cohabitation and marriage. Religious rules on alcohol consumption relate to the likelihood of miscarriages; religious values transmit into abortion laws. This fertility behaviour determines the time when young women have their first live birth. Using data from the German Panel Analysis of Intimate Relationships and Family Dynamics, the paper explores whether being Catholic, Protestant, Muslim or non-religious shapes fertility patterns of young women in contemporary Germany. The paper extends earlier analyses by integrating miscarriages and abortions, rather than limiting the analysis to births. Results show that Muslims are the youngest when becoming pregnant for the first time. Protestants delay first pregnancy, but once being pregnant, Protestants are more likely to carry their first pregnancy to term rather than having an abortion. With respect to first pregnancy and its outcome, Catholics surprisingly compare to non-religious women. Against the background of increasing immigration from religiously vivid countries to Germany, the relation between religion and fertility behaviour is likely to remain significant.

Keywords Religion, pregnancy, miscarriage, abortion, live birth, young women

JEL Z12, J13

Introduction

In Germany, there is an institutionalized outreach of Christian religion on individuals – irrespectively of the continued secularization of the last decades. The subsidiarity principle, for example, claims that church and state cooperate in domains like social service provision, family services and childcare. Also, religious parties, schools or informal education appear powerful mechanisms to ensure religious values transmission. At the same time, an increasing immigration of people from Muslim majority countries can be observed throughout the second half of the twentieth century up to the present (Norris/Inglehart 2004, Voas/Fleischmann 2012). The share of Muslims in Germany is estimated between 4.3 and 5 percent of the population (Deutsches Institut für Wirtschaftsforschung 2018, EVANGELISCHE KIRCHE IN DEUTSCHLAND 2013). The Muslim influence on youth works to a greater extent through the religious vitality among immigrants. Within Turkish immigrant families, cultural values such as conservative gender roles and filial obligations remain important (De Valk/Liefbroer 2007). Both religions, Christianity and Islam, found on procreative principles (Bible, Gen 1:28; al-Kahf (Sura 18:46)). But Catholicism, Protestantism and Islam differ in certain norms and rules towards sexual activity, contraception, abortion as well as marriage and divorce. The extensive role that religion can play in fertility only becomes visible when the different pregnancy determinants – sexual activity, contraceptive behaviour, cohabitation, marriage – as well as fertility events – miscarriage, abortion, live birth – are considered. Religion can exert different influence on any of these fertility channels. On the one hand, religion may delay sexual debut and thus delay childbearing. On the other hand, religious norms may restrict contraceptive usage and thus foster childbearing. Moreover, religion may influence the fundamental decision whether to have or not to have a child at all, particularly in the first stage of pregnancy when abortion is an option. Thus, the net effect of religion on fertility can only be assessed if all pregnancy determinants and fertility events are considered simultaneously.

In fact, few empirical studies have taken into account all fertility channels. Some exceptions include e.g. Miller/Valente (2016), Freedman et al. (1961), Brewster et al. (1998), Teachman/Schollaert

(1991), Mosher et al. (1992), Pearce (2010), Mosher et al. (1992) and Levine (2001), where different channels are considered simultaneously. However, a large part of research on religion and fertility is originated in US-evidence. This paper contrasts evidence from Germany. At first, the present paper differentiates between the denominations Catholic, Protestant and Islam. Second, it not only looks at birth events but incorporates also the other two competing fertility events miscarriage and abortion. Third, the paper considers important pregnancy determinants like sexual activity, contraceptive usage, cohabitation and family formation behaviour. Fourth, most research, e.g. Kreyenfeld et al. (2011), relies on retrospective fertility data. In contrast, this paper gains from rich prospective information on fertility behaviour of women born between 1991 and 1993.

Estimation results reveal that Protestant faith still influences fertility behaviour, that Muslims are youngest when becoming pregnant for the first time and that Catholic fertility behaviour compares to that of non-religious women despite relatively strict norms regarding contraception and abortion. Results further suggest that young women living in East Germany have a lower chance to abort first pregnancy. Cohabitation has become a more important prerequisite for a baby than marriage.

Theory and empirical evidence

Sexual activity

According to Catholic doctrine, the very aim of sexual intercourse is procreation. For Protestants and Muslims, procreation is one important function of sexual intercourse. Catholic doctrine orders procreation to occur within marriage. In Islam, premarital sex is considered a moral issue which is taboo. However, for Protestants, procreation can also occur out-of-wedlock. All three religious teachings should imply the postponement of sexual debut as well as less sexual activity among adolescents. Largely concurrent across different research studies, there are found negative associations for adolescents between religion and sexual activity: religious people have their sexual debut later or are sexually less active during their pre-marital period (Studer/Thornton 1987, Goldscheider/Mosher 1991, Brewster et al. 1998, Levine 2001, Meier 2003, Jones et al. 2005, Uecker 2008, Burdette/Hill 2009, BgZA 2010, Smith 2014, Hull et al. 2015).

Contraceptive usage

Religion has different guidelines for contraceptive usage. Whereas Catholicism puts a ban on artificial contraception (Noonan 1986), Islamic teaching has a long tradition in promoting contraception, which, however, is only valid within marriage – outside marriage, it is considered taboo (Omran 1992). Protestant denomination adjusts guidelines to the circumstances of the woman. Women should be prevented from giving birth too young, too old or in too rapid spacing. Therefore, the usage of contraceptive methods is basically approved, though contraceptives have to be applied with responsibility and in consent with the partner (EVANGELISCHE KIRCHE IN DEUTSCHLAND 2004). Empirical evidence shows ambivalent results for Catholic denomination. Throughout the 1960s and 1980s, religious denomination and religiosity continued to be important factors for contraceptive usage (Goldscheider/Mosher 1991). Further, bivariate results indicate that Catholic adolescents agree more often than non-religious adolescents that using contraceptives is morally wrong. On the other hand, there are more Catholic adolescents than non-religious adolescents who report having

used contraceptives at first sex and most recent sex (Regnerus 2007, Bundeszentrale für gesundheitliche Aufklärung 2004). In Germany, young Muslim women feel less informed about contraception than women of other denominations. Immigrant women show lower contracepting incidence at first intercourse – and if they contracept, they tend to apply less efficient methods (Bundeszentrale für gesundheitliche Aufklärung 2010). Analysis focusing on Protestants mainly found few or no differences in contraceptive behaviour compared to other religions (Brewster et al. 1998, Goldscheider/Mosher 1991). Substantially distinctive contraceptive behaviour is rather found among fundamentalist Protestants in the United States who are less likely to use contraceptives (Kahn et al. 1990, Mosher/McNally 1991, Studer/Thornton 1987) or among Protestants in non-western societies who are more likely to use contraceptives (Agadjanian 2001).

Cohabitation and marriage

Religions widely mark family-oriented norms. Most religions promote the creation and raising of children within the institution of marriage. At the same time, many religions discourage divorce. The main Eurasian religions, including Islam and Christianity, comprehend family relationships as sacred (Zimmerman 1974). On cohabitation behaviour, religion usually is silent. However, cohabitation is usually a pre-step to marriage. A great part of couples only transforms into spouses after having passed a period of cohabitation. Regarding fertility timing, the net effect of religion on marriage is not clear. On the one hand, the time of marriage may be preponed – in order to set the prerequisites for childbearing. On the other hand, time of marriage may be delayed because the search for the right spouse is longer - as a consequence of condemned divorce. Empirical evidence seems to uniformly outweigh early marriage and rather supports the delaying effect of religion for Catholics and Protestants (Hammond et al. 1993, Thornton et al. 1992, Sander 1995, Lehrer 2004, Eggebeen/Dew 2009, Hiekel et al. 2015). To the contrary, Muslim women in Europe marry earlier than average and among German Muslims, divorce is less accepted. There are hints that differences in marital behaviour are important in understanding Muslim fertility (Westoff/Frejka 2007, De Valk/Liefbroer 2007, Inglehart et al. 2014).

Miscarriage

Beside well recognized causes of miscarriage like uterine malformations and balanced chromosomal rearrangements in parents (García-Enguídanos et al. 2002), there are causes of miscarriages that are due to the lifestyle of the mother. Well documented is the consumption of alcohol during pregnancy: the risk of miscarriage is significantly increased if the mother consumed alcohol (e.g. Avolos et al. 2014, Feodor Nilsson et al. 2014). The consumption of alcohol may be a cause of miscarriage that is related to religion. Islam restrains alcohol consumption (Elger 2006). This may lead to lower incidence of miscarriages among Muslim women compared to non-Muslim women. Religious norms then save the unborn foetus from risk.

Abortion

The influence of religion on abortion in Germany is particularly apparent. The two Christian parties CDU and CSU contribute to the definition of abortion laws. In addition, women have to receive consultation prior to non-medical or non-criminal abortions (StGB 2017). The consultation offices in Germany are either run by religiously independent organisations such as ProFamilia or by the Catholic and Protestant church (e.g. Caritas, Social Service of Catholic Women). By obligatory consultation prior to abortion, the Church doctrine has influence on the women's decision-making at a quite sensible moment. The Christian church's disapproval of abortion is well documented in several studies (Legge 1983, Rattinger 1993, Scott 1998, Banaszak 1998, Franz/Busch 2004, Jelen et al. 1993). Protestants seem more relaxed with these issues than Catholics, non-denominated persons are most relaxed (Pollack/Müller 2013). The disapproval on abortion is found also in Islamic teaching. However, abortion is allowed depending on the circumstances of pregnancy and stage of gestational development. Yet, higher abortion prevalence is common. For example, the preference for boys in many Muslim countries leads to a higher prevalence of female foetuses abortion (Rispler-Chaim 2008, Unnithan-Kumar 2010). Moreover, Islam allows abortion within marriage, but pregnancy out of marriage is not accepted under sharia law or in Muslim society. Then, abortions can help to maintain

the social status of unmarried women. Many abortions have been the result of unplanned or unwanted pregnancies of unmarried women (Bowen 1997).

Timing of first birth

The preceding pregnancy determinants and fertility events shape the timing of a women's first birth. In the US, the probability of having first birth up to age 23 is significantly lower for Catholics (Rindfuss et al. 1988). Similarly, the probability of live birth for teenagers is significantly lower when they score high on a religious scale (Smith 2014). Miranda (2006) provides evidence from Mexico where young Catholic women have delayed entry into motherhood. For Catholics in Austria, Heineck (2006) finds a rather delaying, though not significant, effect on transitions to first birth. Turkish and Moroccan immigrant women prefer younger ages for entry into motherhood than native women (De Valk/Liefbroer 2007). As the dissolution of marriage is condemned for Catholics, marriage usually occurs later for them. This in turn postpones first childbearing. Teachman and Schollaert (1991) show that Catholics are older when first having kids, but Catholics are faster when measured as duration from marriage. They find out that Catholics delay marriage compared to non-Catholics but once being married, Catholicism speeds birth timing. Pearce (2010) applies event-history analysis. Her results show that those raised Catholic are more likely to have a premaritally conceived birth than those raised mainline Protestant. In her sample, Catholics and non-religious people have an equal chance of non-marital first birth. However, her models do not account for sexual activity, contraceptive behaviour and possible abortions.

Methodology

The net effect of religion on young women's fertility timing in contemporary Germany will be estimated by using the German Panel Analysis of Intimate Relationships and Family Dynamics (pairfam). Pairfam is a representative, annual panel survey of currently nine waves with a rich set of information on demography, partnership, fertility, parenting and intergenerational relationships (Huinink et al. 2011, Brüderl et al 2018). The first wave started in 2008/2009 reaching 12,402 persons. The dataset provides detailed information on religion and on fertility determinants like sexual activity and contraceptive usage. Prospective information in the dataset allows for the right temporal ordering of religious influence on fertility (Marcum 1988). The estimations are restricted to the youngest cohort 1991-1993 where information on fertility determinants during adolescence (e.g. frequency of intercourse, contraceptive usage) are available. The youngest cohort consists of 4,337 respondents in the first wave, where 1,816 females aged 14 to 18 participated at least twice in the survey. The sample is restricted to women who did not have had a live birth before the first interview. Jewish women and women of other religions than Christ or Muslim are excluded because they have no birth events in this sample.

The dependent variable of primary interest is the event of first live birth in a subsequent wave. A discrete-time hazard model is applied. Live birth is an event that is determined by a causal process. After sexual intercourse, pregnancy is the first event that may follow. After becoming pregnant, the woman decides whether to have a live birth or to abort the foetus, where the latter alternative is a quite frequent option among young women (Statistisches Bundesamt 2014, Cygan-Rehm/Riphan 2014). Miscarriage constitutes a similar event to abortion as it terminates pregnancy via non-live embryo or foetus. These multiple kinds of events require an estimation strategy that accounts for conditional processes (Allison 2014). Several fertility analyses assess the birth event without further distinctions between abortion, miscarriage and live birth. In order to illustrate possible misspecifications, this paper will start with an estimation of birth events too, ignoring the causal processes of fertility decisions. Subsequently, this paper proceeds by taking into account these causal

processes (Allison 2014) and running estimations on the event of pregnancy, followed by fitting a multinomial logit model on the different type of events abortion, miscarriage and live birth.

The key independent variable is the religion of the young women, measured as her denomination. Religious denomination captures the belonging to a religious group (e.g. Catholic, Protestant, Muslim) that is usually handed from parents to children and is acquired via baptism.

The estimations account for the controls age, age squared, enrolment in school or vocational qualification, the mother's and father's highest school degree as proxy for socioeconomic background, East German residence, years of sexual activity, contraceptive usage, as well as relationship status (having partner, cohabitating, being married). The likelihood of first birth has a gentle u-shaped relation: the likelihood decreases at very young ages, reaches a minimum and then increases with age. Therefore, estimations will include the variables age as well as age squared. Abundant research points to relevant fertility differentials between East and West Germany (e.g. Peter et al. 2015, Cygan-Rehm/Riphan 2014, Arránz Becker et al. 2010), consequently a dummy will be integrated indicating whether the woman lives in East Germany. Due to compulsory school attendance, adolescents aged until 18 years are to a very high share enrolled in general or vocational education (Niehues/Rux 2006). Enrolment in education and educational attainment exert clear negative effects on underage conception (Paton 2002), on teenage fertility (Alzúa/Velázquez 2017), on entry into motherhood (Blossfeld/Huinink 1991) and on total fertility rate (McClamroch 1996, Castro Martin 1995). Many of the young women of the present analysis are still enrolled in education, are not yet independent from their parental home and do not earn their own stable income. The young women's income or prestige of their employment does not work sufficiently to resemble socioeconomic background. Therefore, parental educational attainment is used as a proxy for socioeconomic background. Wolfe et al. (2001) suggest that parental schooling has an effect on the probability of teen non-marital birth because parents serve as a role model, a provider of information and a monitor of the adolescent's behaviour. In order to prevent sample size reduction due to missing information, the missing values of the control parental highest school degree are

encoded to the reference category throughout the estimations. In essence, they become the meaning of the least socioeconomic background where young women cannot even tell what their parent's education is. Further on, the years in which a woman is sexually active increase the likelihood of pregnancy. It has been shown that early pregnancies are related to early first intercourse (e.g. Jones et al. 2005, BgZA 2010). The use of modern contraceptives, on the other hand, reduces the likelihood of pregnancy. Having a partner as well as cohabitating with him increases the occasions for sexual activities, which in turn increases the likelihood of pregnancy. Marriage is also of crucial relevance for subsequent childbearing (e.g. Arránz Becker et al. 2010).

In order to account for the possibility that religion effects resemble a woman's higher or lower intention to become mother, all models additionally controlled for fertility intentions. Fertility intentions summarize information on whether the woman tried to conceive a child or to get pregnant during the past twelve months as well as her future plans to become mother within the next two years. Further, a considerable number of women get married between the time of conception and delivery. Estimations in this paper control for those shotgun-marriages.

Results

The sample consists of 1,312 young women with 5,718 person-year observations throughout nine waves. Descriptive statistics are reported in Table 1. Roughly 34.2 percent of the young women are denominated to Catholic, 39.3 percent to Protestant Church and 0.9 percent to Islam, the remaining 25.6 percent have no denomination. The women in the sample are aged 14 to 25. About 21.4 percent of the women live in East Germany. The majority of women are still enrolled in education and most of their parents have an intermediate level of education. On average, the women have been sexually active for 3 years and about 13.2 percent do not use modern contraceptives. About 36.4 percent of the women indicate to be single, half of the women have a partner, another 13.1 percent is already cohabitating and a minority of 6.5 percent is already married. If only birth events are taken into account, there are in total 49 women who have their first live births in the sample. At an age

between 15 and 26 years, in Germany, a considerable part of women did not have experienced first birth yet. But if all first pregnancies are taken into account – also pregnancies that lead to abortions or miscarriages, then the number of pregnancy events sums up to 108. These first pregnancies in the sample result in 36 births, 43 abortions, and 24 miscarriages. For another 5 pregnancies, it is not clear what type of event followed first because women indicated to have an abortion as well as a miscarriage and the date of the events within each wave is not reported. The number of abortions in the sample compares to official statistics in Germany that report relatively high abortion events at the beginning of a woman's fertility biography (Statistisches Bundesamt 2014).

– Table 1 about here –

Table 2 presents the results of discrete-time hazard estimations on the transition to first live birth. Estimation 1 includes the denomination variables, showing that for Catholic and Protestant women, the likelihood of having a live birth in the next year is significantly reduced whereas Muslim women are more likely to have a live birth, though not significantly. The sign of the denomination coefficients does not change when more controls are included. Estimation 2 accounts for women's age, their educational enrolment and the parent's highest school degree as a proxy for socioeconomic background. Estimation 3 introduces a dummy for living in East Germany which is positive and significant, indicating that women in East Germany have their first live birth significantly earlier than women in West Germany. The East dummy seems to explain a great fraction of the variance because the z-value of the denomination coefficients decreases largely between estimation 2 and 3. It hints to the fact that the Catholic-dummy is a proxy for living in Western Germany. Estimations 4 and 5 finally introduce years of sexual activity, contraceptive usage and relationship status. All controls show the expected signs, though none of these controls is significant. Also, the denomination coefficients are far from being significant in estimation 4 and 5. Note that the reference category throughout the birth-equations is not having a live birth but also having an abortion or miscarriage. The results of the birth estimations in table 1 may be misleading because important fertility determinants – abortion and miscarriage – are blended with not being pregnant within the same reference category. Many

analyses on fertility show this haziness. Fortunately, pairfam data records abortion and miscarriage events.

– Table 2 about here –

Table 3 presents results of discrete-time hazard estimations on the transition to first pregnancy. The analysis follows the approach for causal processes by Allison (2014) that lead to different kind of events (birth, abortion, miscarriage). The estimations in table 3 assess the influence of denomination on the fact to become pregnant (irrespectively of the outcome of pregnancy), compared to not becoming pregnant. These estimations assess the net effect of denomination on the incidence of pregnancy. Estimation 1 shows a strong influence of denomination on the likelihood of pregnancy. Similarly to the live birth equations in table 2, Catholic or Protestant women are significantly less likely to become pregnant in the subsequent wave. Catholic and Protestant faith indeed seems to delay pregnancies. Islam, on the contrary, seems to enhance pregnancy. Controls in estimation 2 show significant negative influence of being enrolled in education and of paternal educational attainment. Estimation 3 adds an East dummy which turns out to be positive but insignificant. This would imply that East German women do not become pregnant significantly earlier than their Western German counterparts. Similarly to the birth equations, the z-values of the Protestant and Catholic coefficient are diminishing, meaning that the East dummy explains substantial variation. In addition, the significance of the Catholic coefficient vanishes, indicating that the Catholic dummy is merely a proxy for living in West Germany rather than resembling religious influence on becoming pregnant. After accounting for the controls in estimation 3, one can see that Protestant women have a significantly reduced – and Muslim women significantly increased – likelihood to become pregnant than non-religious women. Estimation 4 introduces determinants that directly influence fertility outcomes. Every year that women are sexually active, their probability of becoming pregnant increases significantly. Pregnancy is also highly enhanced if women do not use modern contraceptives. Estimation 5 includes relationship controls that show that cohabitating plays a key role in predicting pregnancy in the subsequent wave. Within the full model and after accounting for

pregnancy determinants, the significant negative influence of being denominated to Protestant church on becoming pregnant persists. Also does the significant positive influence on becoming pregnant for Muslim women. Catholic women are not more or less likely to become pregnant than non-religious women. Their initially reduced likelihood to become pregnant was an artefact of other controls, mainly the West German residence, but also due to different contraceptive and family formation behaviour. Protestant women have on average a 0.3 percentage point decreased probability of becoming pregnant compared to non-religious women. The likelihood of Muslim women to become pregnant is increased by 6 percentage points compared to non-religious women. However, not every pregnancy ends in a live birth. Possible outcomes of pregnancy are a miscarriage or abortion. The outcome of pregnancy differs according to health status (miscarriage) as well as social norms, values and individual preferences (live birth, abortion). In order to estimate the likelihood of the different types of events (live birth, abortion, miscarriage), the following analysis continues with multinomial logit estimations that include only women who became pregnant.

– Table 3 about here –

The results of the multinomial logit model on the fertility events are presented in table 4. Once having become pregnant, the model estimates the influence of religion on the likelihood to have a live birth, an abortion or a miscarriage where abortion is the base outcome. The estimated marginal effect of each covariate on the probability of observing a live birth is displayed in parenthesis in the first column of table 4. Though the probability of pregnancy was shown lower for Protestants (table 3), the estimates of table 4 show that once being pregnant, for Protestant women it is significantly more likely than for non-religious women that their pregnancy ends in a live birth. Under the condition that the woman is not having an abortion or miscarriage, being Protestant (compared to being non-religious) increases the average probability of having a live birth in subsequent wave by 0.370. This seems not to be true for Catholic and Muslim women where the corresponding coefficients are insignificant. Recalling results from table 3, Catholics were not significantly more or less likely to become pregnant than non-religious women. In addition, results in table 4 show that

there seems to be no distinctive fertility behaviour between Catholic and non-religious women, once they have become pregnant. For Muslim women, the results from table 3 indicated an increased likelihood of pregnancy. Table 4 now points to the fact that the outcome of Muslim pregnancies seems to be largely determined by the absence of miscarriages. Being Muslim, compared to being non-religious, significantly decreases the average probability of having a miscarriage by 0.284. As Islam restrains alcohol consume (Elger 2006), the lower incidence of miscarriages may be plausible. However, due to few fertility events within the small Muslim subpopulation, results have to be interpreted carefully. Women in East Germany are significantly more likely than women in West Germany to have a live birth compared to have an abortion. Pregnant women in East Germany have on average a 0.413 higher probability of giving birth than women in West Germany. Interestingly, women who do not use modern contraceptives are significantly less likely to have a live birth compared to having an abortion. Their average probability of giving birth is decreased by 0.428. At first glance, unsafe contraception leading to fewer live births is counterintuitive. However, within the multinomial logit frame, the result indicates that modern contraception and abortion may be substitutes. It seems that young women in Germany either use modern contraceptives or apply abortion as a method to prevent live birth of unwanted children. Further on, family formation behaviour plays a decisive role for fertility outcomes. Women who are cohabitating are significantly more likely to give birth in the subsequent wave than experiencing an abortion. The average probability of having a live birth is increased by 0.390 for women who already cohabitate with their partner. The fact that married women may have significantly more miscarriages may partly be explained by their increased intentions to become a mother. Women marry in order to start a family. They will then have higher intentions to become pregnant. But an estimated 10 to 31 percent of all pregnancies will be lost due to miscarriages (Wilcox et al 1988, Universitätsklinikum Bonn 2020).

– Table 4 about here –

Figure 1 illustrates that the predicted probabilities of Protestants to have a live birth, compared to have an abortion, are higher than for Catholics, Muslims or non-religious women. The fertility pattern

of Catholics at this point is contrary to theoretical predictions. The Catholic pro-life teaching would rather suggest that their fertility patterns are distinctive from non-religious women. Once being pregnant, the likeliness of live birth should be higher for Catholic women than for non-religious women. Instead, the probability of having the pregnancy outcome live birth is not significantly different for Catholics and non-religious women.

– Fig. 1 about here –

Figure 2 illustrates the lower predicted probabilities of Muslim women to have a miscarriage, compared to having an abortion. However, because miscarriage is an event that is assumed not to be induced on purpose, the following estimations will exclude this fertility outcome.

– Fig. 2 about here –

Table 5 present the logit estimations of having an abortion compared to having a live birth in the subsequent wave. Live birth and abortion are fertility events that result after a decision-making process. After becoming pregnant, the women can decide either carrying the pregnancy to term and having a live birth or terminating the pregnancy via abortion. This decision-making is highly influenced by social norms, values and individual preferences. According to the estimations, religion does indeed seem to play a role in this decision-making process. After controlling for direct and indirect fertility determinants, Protestant women are significantly less likely to terminate their pregnancy via abortion. The average probability of having an abortion is decreased by 44 percentage points for Protestant women compared to non-religious women. Interestingly, the Protestant coefficient becomes stronger as further controls are accounted for. For Catholic and Muslim women, the probability to have an abortion does not differ significantly from those women who report being non-religious. Residence in West or East Germany also plays an important role in the probability of abortion. The estimation shows that the likelihood to have an abortion is significantly decreased if the woman lives in East Germany, their average probability is decreased by 44 percentage points. Results of the logit estimation in table 5, similarly to the estimations of the multinomial logit in table

4, hint to the fact that modern contraceptives and abortions are substitutes. If the woman did not apply modern contraceptives, the likelihood of abortion is significantly increased by almost 50 percentage points. The other way around, if the woman uses modern and safe contraceptives, there is less need to terminate an unwanted pregnancy via abortion. Similar to the estimations on the likelihood of pregnancy and different pregnancy outcomes, the family formation process plays a decisive role in the estimations of table 5. Many women aged 16 to 26 do have a partner. At the same time, only a minority of them is already married. However, cohabitation is a strong predictor for carrying a pregnancy to term compared to terminating an existing pregnancy via abortion. The results show that cohabitation is an important kick-off for childbearing. If pregnant, the average probability of cohabitating women to have an abortion is reduced by 41 percentage points.

– Table 5 about here –

Figure 3 illustrates that the predicted probabilities of having an abortion are lower for Protestants than for Catholics, Muslims or non-religious women. This again is a surprising finding. In the Catholic Church, abortion is condemned. Protestant and Muslim teaching also favours live birth as the outcome of a pregnancy. However, Protestantism and Islam are less restrictive than Catholicism with respect to abortion issues. In line with Catholic teaching, the probability of abortions should be lower for Catholic women than for Protestant and Muslim women and it should be explicitly lower than for non-religious women.

– Fig. 3 about here –

The findings can be summed up as following: First, religion continues to have influence on fertility behaviour of young women in Germany. This is especially true for Protestant women. Protestant young women in Germany delay their first pregnancy compared to non-religious women. However, once being pregnant, Protestant women are more likely to carry their first pregnancy to term and they are less likely to terminate their first pregnancy via abortion. Muslim women in Germany are much younger when they are pregnant for the first time. But once being pregnant, the probability for

Muslim women to have a live birth or to have an abortion does not differ significantly from that of non-religious women. An interesting finding is the reduced likelihood of miscarriages for Muslim women which may be drawn to reduced alcohol consume prior to and during pregnancy. It would be interesting to confirm this result on the basis of analysis with larger Muslim subpopulations. Fertility behaviour of Catholic women does not differ significantly from that of non-religious women. The Catholic coefficients throughout all estimations were only significant in the reduced model. But after accounting for further controls, the difference between Catholic and non-religious women could be explained away. Theoretically, one would expect that fertility behaviour of Catholic women differs from that of non-religious women because of the pro-life thinking of the Catholic Church. Particularly, once being pregnant, the likeliness of live birth should be higher for Catholic women than for non-religious women. The probability of abortions should be lower for Catholic women than for Protestant and Muslim women and it should be explicitly lower than for non-religious women. Instead, Catholic women are equally likely as non-religious women to become pregnant, to have an abortion or to have live births at the beginning of their fertility biography. Solely for Protestant women, the fertility behaviour differs significantly from that of non-religious women. The multinomial estimations on the different pregnancy outcomes reveal that women who do not use modern contraceptives are significantly less likely to have a live birth compared to having an abortion. At first glance, it seems counterintuitive, that unsafe contraception leads to fewer live births. However, within the multinomial logit frame, the result indicates that modern contraception and abortion may be substitutes. It seems that young women in Germany either use modern contraceptives or apply abortion as a method to prevent live birth of unwanted children. Finally, the role of family formation within the fertility process has changed over the last decades. Up to the 1960s and 1970s, marriage was a prerequisite for starting a family and having children. Many research proofs that this social norm has been eroded. In line with former research, all estimations throughout this paper, detect cohabitation as the major determinant for becoming pregnant. It is not the fact of having a partner or being married that is influential. Instead, living together seems to be

the most important step for contemporary family formation of young women in Germany. Cohabitating also plays an important role in the decision whether to carry the pregnancy out to term or to have an abortion.

Various tests check the robustness of the results. In order to account for the possibility that religion effects resemble a woman's higher or lower intention to become mother, all models additionally controlled for fertility intentions during the past year and upcoming two years. After controlling for fertility intentions, the religion effects remained robust (results not shown). Then, a considerable number of women get married between the time of conception and delivery. However, the results remained robust after controlling for those shotgun-marriages (results not shown). Possible self-selection of the young women into a denominational group and its adverse effect on estimation results are of minor relevance for two reasons. First, for the majority of young women, denomination is rather inherited by their parents than self-selected. Second, the share of women that convert from one denominational group to another within the observation period is about 1 percent low.

Conclusion

The findings of the present paper extend earlier analyses by using prospective data and taking other fertility events (abortions, miscarriages) into account rather than limiting the analysis to births. The key findings are the following.

First, despite declining religiosity levels, religion still shapes fertility patterns of young women in Germany. This decision-making of having a live birth or having an abortion is highly influenced by social norms, values and individual preferences. According to the estimations, religion does indeed seem to play a role in this decision-making process. This is especially true for Protestant women. Protestant women behave in a way that delays their first pregnancy. But once being pregnant, Protestant women show more pro-native tendency because they are more likely to carry their first pregnancy to term rather than having an abortion. After controlling for sexual activity, contraceptive use and relationship status, Protestant women are significantly less likely to terminate their pregnancy via abortion. Muslim women in Germany are much younger when they become pregnant for the first time. But once being pregnant, the probability for Muslim women to have a live birth or to have an abortion does not differ significantly from that of non-religious women. Surprising is that Catholic women have a similar chance of becoming pregnant as non-religious women. Further on, once being pregnant, the pregnancy outcomes of Catholic women do not differ significantly from that of non-religious women. For Catholic (and also Muslim) women, the probability to have an abortion does not differ significantly from those women who report being non-religious.

Theoretically, there are important moral objections of Catholics towards abortions. Catholic doctrine puts clear guidelines for fertility-related behaviour like sexual activity, contraceptive behaviour and abortions. However, the data rather suggest that these objections do not transform into the decision-making of Catholic young women in Germany. If the Catholic norms were still valid for young women, they could lead to distinctive behaviour between Catholics and Protestants. At least, they should lead to distinctive fertility behaviour between Catholics and non-religious women.

However, it seems that the more liberal Protestant guidelines are valid for young Protestant women: Protestant women are significantly less likely to become pregnant, they are significantly more likely to carry their first pregnancy to term and they are significantly less likely to abort.

Second, differences between women living in East and West Germany remain striking. The residence plays a decisive role in the outcome of a pregnancy. Women in East Germany are much more likely to have a live birth compared to an abortion than women in West Germany. The estimation in table 5 shows that the likelihood to abort the first pregnancy is significantly decreased if the woman lives in East Germany, their average probability is decreased by 44 percentage points. This result fits those of Cygan-Rehm and Riphan (2014) who show with data from German Federal Statistics Office that the share of abortions in all teen pregnancies (sum of births and abortions) is higher in West Germany (45 percent) than in East Germany (36 percent). The authors follow that the differences in East and West German teen birth outcomes are due to different levels of teenage pregnancies rather than to different abortion patterns. However, the results of the present paper would rather suggest that these differences are due to distinctive decision-making after becoming pregnant. East and West German women did not differ in the incidence to become pregnant, but in the incidence to abort. This in turn compares to the results of Federal Centre for Health Education (Helfferich et al.) where in West Germany, there are more abortions detected at the beginning of the woman's fertile period and where in East Germany, there are more abortions after having completed the desired number of children.

Third, the changing role of family formation within the fertility process has become evident. Marriage is no longer the most important step to start a family. In contemporary Germany, cohabitating turns out to be a more important predictor for first pregnancy than marriage.

The strength of this paper is the prospective design of the fertility history of the women aged 16 to 26. The exact temporal ordering of events is much more precise than in retrospective surveys. Reverse causality, thus, should not be the main issue throughout the analysis. Despite secularization

in Germany throughout the last decades, there has been a tendency of increased pluralisation of religion. The share of persons who do not belong to the Protestant or Catholic Church has increased. This is partly due to increased immigration to Germany from Muslim-majority countries. This development may intensify the relationship between religion and fertility behaviour in the future. The present paper focuses on women who are at the beginning of their fertility biography. It cannot draw conclusions on their ongoing or completed fertility – a limitation which invites future research.

Compliance with Ethical Standards

Conflict of Interest: The author declares that there is no conflict of interest.

Table 1 – Descriptive statistics of the sample

Variable		Definition	Obser-vations	Mean	Std. Dev.	Min	Max
First birth in subsequent wave		Event of first birth in subsequent wave	5,718	0.009	0.092	0	1
Catholic		Dummy equal to 1 if denomination is Catholic	5,718	0.342	0.475	0	1
Protestant		Dummy equal to 1 if denomination is Protestant	5,718	0.393	0.488	0	1
Islam		Dummy equal to 1 if denomination is Islam	5,718	0.009	0.092	0	1
No denomination		Dummy equal to 1 if there is no denomination	5,718	0.256	0.436	0	1
Age anchor		Age of the young woman	5,718	19.487	2.268	14	25
Age anchor squared		Squared age of the young woman	5,718	384.866	89.260	196	625
Enrolment in education		Enrolment in school or vocational education	5,718	7.221	4.734	0	13
maternal educational attainment	no upper education	Dummy equal to 1 if mother of the young woman has low education	5,718	0.616	0.486	0	1
	upper education	Dummy equal to 1 if mother of the young woman has upper education	5,718	0.343	0.475	0	1
paternal educational attainment	no upper education	Dummy equal to 1 if father of the young woman has low education	5,718	0.560	0.496	0	1
	upper education	Dummy equal to 1 if father of the young woman has upper education	5,718	0.325	0.469	0	1
Residence in East Germany		Dummy equal to 1 if living in East Germany	5,718	0.214	0.410	0	1
Years of sexual activity		Number of years of sexual experience	5,718	3.065	2.408	0	16
No modern contraception		Dummy equal to 1 if not using modern contraception	5,718	0.132	0.339	0	1
Single		Dummy equal to 1 if being single	5,718	0.364	0.481	0	1
Having partner		Dummy equal to 1 if having a partner	5,718	0.499	0.500	0	1
Cohabitating		Dummy equal to 1 if cohabitating	5,718	0.131	0.337	0	1
Married		Dummy equal to 1 if being married	5,718	0.006	0.080	0	1

Table 2 – Adolescent's religion predicting transition to first birth – Random effects logit estimations

First birth in subsequent wave		1	2	3	4	5
		Birth	Birth	Birth	Birth	Birth
Catholic[(1)]		-1.092*	-1.362	-0.689	-0.975	-0.889
		(-2.49)	(-1.52)	(-1.00)	(-0.56)	(-0.39)
Protestant[(1)]		-1.280*	-1.741	-1.113	-1.957	-1.994
		(-2.52)	(-1.52)	(-1.30)	(-0.35)	(-0.38)
Islam[(1)]		1.213	1.196	1.617	4.444	4.221
		(1.13)	(0.76)	(1.07)	(0.57)	(0.75)
Age anchor			2.183+	2.060+	3.092	3.093
			(1.68)	(1.72)	(0.55)	(0.68)
Age anchor squared			-0.050	-0.048	-0.082	-0.085
			(-1.60)	(-1.62)	(-0.58)	(-0.73)
Enrolment in education			-0.086*	-0.086*	-0.093	-0.082
			(-2.28)	(-2.47)	(-1.38)	(-1.23)
maternal educational attainment[(2)]	no upper education		-0.358	-0.396	-1.100	-0.978
			(-0.38)	(-0.48)	(-0.63)	(-0.51)
	upper education		-0.848	-0.730	-1.691	-1.540
			(-0.73)	(-0.73)	(-0.50)	(-0.48)
paternal educational attainment[(2)]	no upper education		-0.341	-0.306	-0.138	-0.199
			(-0.45)	(-0.48)	(-0.09)	(-0.14)
	upper education		-2.574+	-2.339+	-3.549	-3.569
			(-1.66)	(-1.83)	(-0.34)	(-0.45)
Residence in East Germany				0.828+	1.224	1.187
				(1.76)	(0.71)	(0.88)
Years of sexual activity					0.717	0.668
					(0.42)	(0.49)
No modern contraception					1.515	1.560
					(0.66)	(0.82)
Having partner[(3)]						0.132
						(0.21)
Cohabitating[(3)]						1.951
						(1.36)
Married[(3)]						3.914
						(1.08)
Constant		-4.979***	-28.34*	-26.90*	-39.89	-39.31
		(-7.12)	(-1.98)	(-2.08)	(-0.53)	(-0.67)
lnsig2u		0.779	2.069+	1.759	3.211	3.225
		(0.84)	(1.93)	(1.63)	(0.69)	(0.87)
Observations		5,718	5,718	5,718	5,718	5,718
ll		-274.2	-259.8	-258.8	-249.2	-243.2

[(1)] Religion Reference = no denomination [(2)] Parental education Reference = missing information [(3)] Relationship Reference = single

Z-statistics in parenthesis. Z-values clustered at individual level.

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 3– Adolescent's religion predicting transition to first pregnancy – Random effects logit estimations

Pregnancy (of first fertility event)		1	2	3	4	5
		Pregnancy	Pregnancy	Pregnancy	Pregnancy	Pregnancy
Catholic[(1)]		-0.798**	-0.770*	-0.490	-0.521	-0.478
		(-3.14)	(-2.29)	(-1.40)	(-1.21)	(-1.16)
						[-.002]
Protestant[(1)]		-1.338***	-1.360**	-1.111*	-1.400*	-1.314*
		(-4.50)	(-3.04)	(-2.53)	(-2.21)	(-2.03)
						[-0.004]
Islam[(1)]		1.422*	1.378	1.575+	2.896+	2.688+
		(2.00)	(1.57)	(1.75)	(1.90)	(1.77)
						[0.068]
Age anchor			1.088	1.080	1.448+	1.400
			(1.48)	(1.47)	(1.70)	(1.64)
						[0.004]
Age anchor squared			-0.026	-0.026	-0.039+	-0.039+
			(-1.37)	(-1.36)	(-1.79)	(-1.74)
						[-0.0001]
Enrolment in education			-0.061**	-0.062**	-0.059*	-0.054*
			(-2.58)	(-2.66)	(-2.19)	(-2.00)
						[-0.0001]
maternal educational attainment[(2)]	no upper education		0.061	0.041	-0.0683	-0.0667
			(0.11)	(0.08)	(-0.09)	(-0.10)
						[-0.0002]
	upper education		-0.301	-0.276	-0.484	-0.434
			(-0.47)	(-0.44)	(-0.58)	(-0.55)
						[-0.001]
paternal educational attainment[(2)]	no upper education		-0.782+	-0.775+	-0.923	-0.874
			(-1.89)	(-1.94)	(-1.62)	(-1.56)
						[-0.004]
	upper education		-1.445*	-1.408*	-1.754+	-1.613+
			(-2.04)	(-2.05)	(-1.94)	(-1.83)
						[-0.006]
Residence in East Germany				0.410	0.520	0.470
				(1.43)	(1.32)	(1.24)
						[0.001]
Years of sexual activity					0.346*	0.297+
					(2.07)	(1.73)
						[0.001]
No modern contraception					1.210***	1.224***
					(3.85)	(3.52)
						[0.003]
Having partner[(3)]						0.199
						(0.65)
						[0.0004]
Cohabitating[(3)]						0.779*

					(2.11)
					[0.003]
Married[3]					0.584
					(0.35)
					[0.002]
Constant	-3.487***	-13.82+	-13.89+	-18.33*	-17.49*
	(-8.32)	(-1.91)	(-1.95)	(-2.12)	(-1.97)
lnsig2u	-0.735	0.313	0.102	1.652+	1.406
	(-0.32)	(0.16)	(0.04)	(1.66)	(1.04)
Observations	5561	5561	5561	5561	5561
ll	-513.4	-496.5	-495.6	-480.7	-478.4

[1] Religion Reference = no denomination [2] Parental education Reference = missing information [3] Relationship Reference = single

Z-statistics in parenthesis. Z-values clustered at individual level.

Average marginal effects in square brackets

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 4 – Adolescent's religion predicting transition to first fertility event: live birth, miscarriage, abortion (= reference) – Multinomial logit estimations

		1	2
First fertility event		Live birth	Miscarriage
Catholic[(1)]		0.588	0.166
		(0.61)	(0.18)
		[0.096]	[-0.006]
Protestant[(1)]		1.854*	0.434
		(1.98)	(0.52)
		[0.370]	[-0.085]
Islam[(1)]		0.795	-15.410***
		(0.52)	(-11.91)
		[0.258]	[-0.284]
Age anchor		-0.204	1.903
		(-0.10)	(0.86)
		[-0.144]	[0.253]
Age anchor squared		0.004	-0.045
		(0.07)	(-0.80)
		[0.003]	[-0.006]
Enrolment in education		-0.050	-0.020
		(-0.87)	(-0.33)
		[-0.010]	[-0.000]
maternal educational attainment[(2)]	no upper education	0.333	-0.788
		(0.33)	(-0.72)
		[0.121]	[-0.142]
	upper education	-0.350	-0.541
		(-0.31)	(-0.42)
		[-0.034]	[-0.076]
paternal educational attainment[(2)]	no upper education	0.692	-0.945
		(0.87)	(-1.20)
		[0.199]	[-0.176]
	upper education	0.010	-0.390
		(0.01)	(-0.35)
		[0.024]	[-0.072]
Residence in East Germany		1.689+	-0.631
		(1.92)	(-0.80)
		[0.413]	[-0.167]
Years of sexual activity		-0.044	0.072
		(-0.28)	(0.51)
		[-0.014]	[0.011]
No modern contraception		-2.009**	-0.466
		(-3.06)	(-0.74)
		[-0.428]	[0.044]
Having partner[(3)]		-0.450	-0.0441
		(-0.75)	(-0.07)
		[-0.085]	[0.011]
Cohabitating[(3)]		1.715+	0.318

	(1.81)	(0.33)
	[0.390]	[-0.059]
Married[3]	2.036	17.090***
	(1.59)	(12.06)
	[-0.308]	[0.867]
Constant	1.161	-19.22
	(0.06)	(-0.89)
Observations	103	
ll	-87.28	

[1] Religion Reference = no denomination [2] Parental education Reference = missing information [3] Relationship Reference = single

Z-statistics in parenthesis. Z-values clustered at individual level.

Average marginal effects in square brackets

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Note: excluding 5 observations that reported abortion and miscarriages in same periods

Table 5 – Adolescent's religion predicting transition to first fertility event: live birth, abortion – Logit estimations

Abortion		1	2	3	4	5
		Abortion	Abortion	Abortion	Abortion	Abortion
Catholic[(1)]		0.323	0.343	-0.400	-0.510	-0.798
		(0.58)	(0.57)	(-0.47)	(-0.49)	(-0.84)
						[-0.185]
Protestant[(1)]		-0.414	-0.274	-0.869	-1.342	-1.892*
		(-0.68)	(-0.44)	(-1.00)	(-1.45)	(-2.03)
						[-0.440]
Islam[(1)]		0.243	0.365	-0.403	-0.549	-0.916
		(0.25)	(0.37)	(-0.34)	(-0.35)	(-0.60)
						[-0.214]
Age anchor			-1.413	-1.542	0.0815	0.649
			(-0.76)	(-0.85)	(0.04)	(0.28)
						[0.159]
Age anchor squared			0.035	0.038	-0.004	-0.016
			(0.73)	(0.82)	(-0.07)	(-0.27)
						[-0.004]
Enrolment in education			-0.004	-0.0004	0.060	0.066
			(-0.09)	(-0.01)	(1.07)	(1.07)
						[0.016]
maternal educational attainment[(2)]	no upper education		-0.163	-0.123	0.053	-0.734
			(-0.19)	(-0.14)	(0.06)	(-0.68)
						[-0.175]
	upper education		-0.007	0.137	0.615	0.400
			(-0.01)	(0.11)	(0.47)	(0.30)
						[0.080]
paternal educational attainment[(2)]	no upper education		-0.224	-0.294	-0.794	-0.641
			(-0.36)	(-0.48)	(-1.06)	(-0.78)
						[-0.153]
	upper education		0.859	0.721	0.150	-0.132
			(0.66)	(0.53)	(0.11)	(-0.10)
						[-0.030]
Residence in East Germany				-0.914	-1.344	-1.779*
				(-1.17)	(-1.64)	(-2.00)
						[-0.437]
Years of sexual activity					0.012	0.070
					(0.08)	(0.46)
						[0.0170426]
No modern contraception					2.244***	2.024**
					(3.43)	(3.15)
						[0.498]
Having partner[(3)]						0.541
						(0.90)
						[0.120]
Cohabitating[(3)]						-1.861+

					(-1.77)
					[-0.413]
Constant		0.163	14.48	16.53	0.471
		(0.49)	(0.80)	(0.93)	(0.02)
Observations		79	79	79	79
ll		-53.81	-52.15	-51.44	-44.88

(1) Religion Reference = no denomination (2) Parental education Reference = missing information (3) Relationship Reference = single

Z-statistics in parenthesis. Z-values clustered at individual level.

Average marginal effects in square brackets

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Fig. 1 – Predicted Probabilities for having a live birth (compared to having an abortion) for different denominational groups

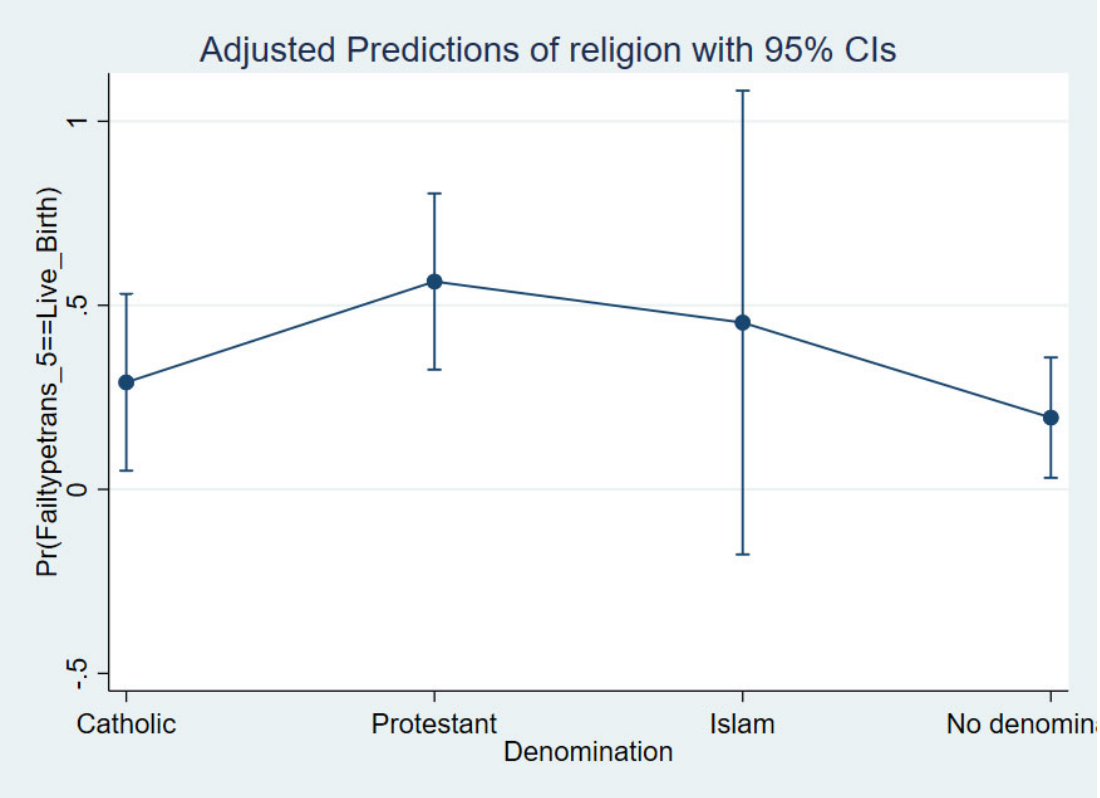

Fig. 2 – Predicted Probabilities for having a miscarriage (compared to having an abortion) for different denominational groups

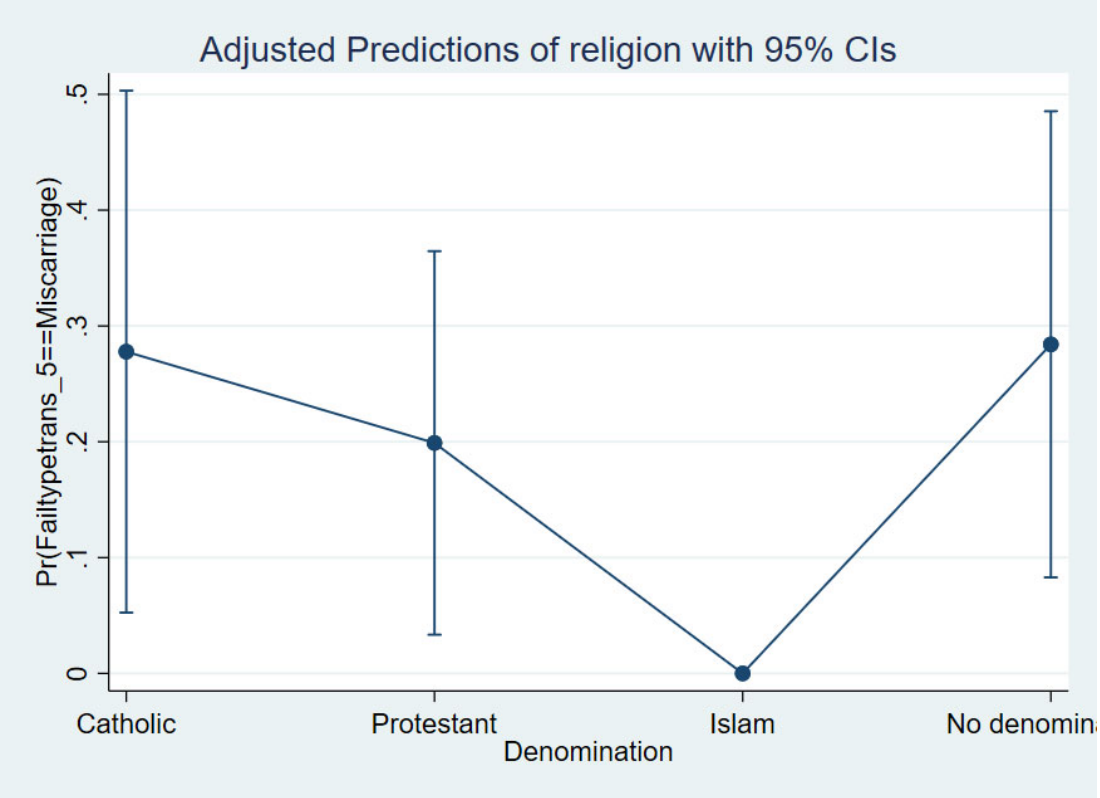

Fig. 3 – Predicted Probabilities for having an abortion (compared to having a live birth) for different denominational groups