

## 5 Chapter 8 Appendix

### 5.1 Assessing the Impact of Conflict on Fractionalization

We now turn to our primary focus that is the link between the long-run patterns of conflict and various measures of fractionalization. To that end, we cover the period between 1400 and 1900 CE to estimate the following regression:

$$\begin{aligned} \text{Fractionalization}_i &= \lambda_0 + \lambda_1 \text{Total Conflicts}_i \\ &+ \lambda_2 \text{Muslim-Christian Conflicts}_i + \lambda_3 \text{Protestant-Catholic Conflicts}_i \\ &+ \lambda_4 \text{Pogrom}_i + \lambda_5 \text{Duration of Total Conflicts}_i \\ &+ \lambda_6 \text{Duration of Muslim-Christian Conflicts}_i \\ &+ \lambda_7 \text{Duration of Protestant-Catholic Conflicts}_i \\ &+ \lambda_8 \text{Duration of Pogroms}_i + \lambda_9 \text{Other Controls}_i + \varepsilon_i, \end{aligned} \tag{A.8.1}$$

where  $\text{Fractionalization}_i$  is one of three alternative dependent variables constructed by Alesina et al. (2003);  $\text{Total Conflicts}_i$  is the total number of violent confrontations that occurred within country  $i$ 's borders between 1400 CE and 1900 CE;  $\text{Muslim-Christian Conflicts}_i$  is the count of violent confrontations between Muslims and Christians which took place in country  $i$  over the relevant time span;  $\text{Protestant-Catholic Conflicts}_i$  is the count of violent conflicts between Catholics and Protestants that occurred in country  $i$  between 1400 CE to 1900 CE;  $\text{Pogrom}_i$  is the number of Jewish pogroms which took place in country  $i$  during the same period; and  $\text{Duration of Total Conflicts}_i$ ,  $\text{Duration of Muslim-Christian Conflicts}_i$ ,  $\text{Duration of Protestant-Catholic Conflicts}_i$ ,  $\text{Duration of Pogroms}_i$  denote the average duration of the types of conflict, respectively.

In our most parsimonious empirical specifications, the set of control variables includes nine geographic dummy variables for *Western Europe*, *Central Europe*, *Eastern Europe*, *Northern Europe*, *the Balkans*, *Africa*, *Asia*, *the Middle East* and *islands*. Note that, taken together, two of those geographic dummies, *Eastern Europe* and *the Balkans*, define what turned out to be the historical buffer zone between Christian and Muslim societies. In other more comprehensive estimates, we also include as additional controls the population level of  $i$  in 1994, the distance from the equator of country  $i$ 's capital, a dummy for whether or not  $i$  is landlocked, country  $i$ 's land area in  $km^2$ , the population estimates for 1000 CE and 1500 CE, the distance of country  $i$ 's capital from the three ecclesiastical centers of Rome, Jerusalem and Mecca, dummies for whether a majority of the population was Christian or Muslim in 1994, and the years during which each of the four types of conflict took place on average.

Table A.8.1 displays results from four regressions that employ religious fractionalization as the dependent variable. Column (1) shows results from the most parsimonious of regressions, with controls only for geographic region. As mentioned earlier, certain areas of Europe tend to be more homogeneous than others, hence the addition of geographic dummies controls for regional differences. Column (2) adds *Land Area*, which is reported, though not significant, a dummy for whether the country is landlocked and current population, in case fractionalization is correlated with population size. [It is important to control for country size to the extent that country formation is endogenous and causality runs from violent confrontations to country size, which in turn affects our measures of fractionalization. Put differently, to the extent that the impact of conflicts on fractionalization arises from endogenous country formation, controlling for *Land Area* could help to limit omitted variable biases.]

Column (2) also adds variables for distance to the equator and a dummy for whether a country is landlocked. Column (3) builds on the specification in (2) with the additional variables of distance to major religious centers of Mecca, Rome and Jerusalem, as well as a dummies for whether the country had a Muslim or Christian majority in 1994, and its population in the years 1000 and 1500 CE. Of these, only the religious majority coefficients are reported. [The coefficients not shown typically are statistically insignificant, with occasionally alternating signs across the different empirical specifications.] Column (4) adds

variables associated with the average year of the conflict both in general and by the types of religious conflict, although they are not reported. All in all, these additional control variables are highly correlated with duration and do not appear to have a large effect on magnitude or significance of the variables in question.

In all four regressions in Table A.8.1, religious fractionalization depends negatively and statistically significantly on the *frequency* of Muslim on Christian confrontations and typically positively—though not significantly—on violence between Protestants and Catholics. These results buoy the thesis that the long-run incidence and patterns of religious conflicts—in this case, those between Muslims and Christians—did impact the contemporaneous extent of religious fractionalization within countries. The role of historical conflicts in influencing modern-era fractionalization is quite large. In the simplest regression in Table A.8.1, for instance, one more violent incident in which Muslims fought Christians is associated with close to five percent less religious fractionalization, or a generally more homogenous religious community some 400 years later. The result increases in magnitude as controls are introduced and remains statistically significant. Additionally, we see that the *duration* of Muslim versus Christian conflicts enters negatively, decreasing fractionalization by 6 to 9 percent depending on the specification, though reaching statistical significance only in column (2). The *frequency* of Jewish pogroms is also associated with increased religious fractionalization, although the magnitude and significance varies by specification. However, the duration of pogroms is associated with decreased fractionalization.

While these baseline results show a pattern that will remain at the fore the rest of the way, they also invite the question of why Muslim on Christian conflicts had an opposite impact than those between Protestants and Catholics or Jewish pogroms. There is no clear cut answer to this. A plausible conjecture is that the types of conflict in question also differ from one another in the extent to which the underlying sources of conflict have been mitigated or resolved in the course of time—however, superficially or fundamentally that may be.

In particular, the process through which the Protestant and Catholic Christian denominations came to terms with their underlying differences was arduous and prolonged. The seeds of this confrontation lay in centuries past and the

‘heretical’ movements of Lollardy, Huguenots and Hussites. The confrontation spanned more than 130 years between the start of the Reformation in 1517 and its culmination with the Treaty of Westphalia signed at the end of the Thirty Years War in 1648. When this fundamental ecclesiastical disagreement was eventually resolved, religious pluralism started to become the accepted European norm.

**Table A.8.1:** Impact of Conflicts on Religious Fractionalization (1400 – 1900 CE)

| Dependent Variable:              | Religious Fractionalization |                   |                   |                   |
|----------------------------------|-----------------------------|-------------------|-------------------|-------------------|
|                                  | (1)                         | (2)               | (3)               | (4)               |
| <i>Total Conflicts</i>           | .0008<br>(.002)             | -.001<br>(.003)   | .0002<br>(.006)   | .003<br>(.007)    |
| <i>Muslim-Christian Conf.</i>    | -.016**<br>(.008)           | -.020*<br>(.007)  | -.019**<br>(.010) | -.022**<br>(.011) |
| <i>Protestant-Catholic Conf.</i> | .002<br>(.016)              | -.0005<br>(.018)  | .002<br>(.035)    | .028<br>(.051)    |
| <i>Pogrom</i>                    | .117<br>(.153)              | .218<br>(.161)    | .329<br>(.199)    | .682*<br>(.240)   |
| <i>Duration of Total Conf.</i>   | .053*<br>(.025)             | .054*<br>(.026)   | .062**<br>(.032)  | .053<br>(.034)    |
| <i>Dur. of Mslm-Chrst. Conf.</i> | -.031<br>(.021)             | -.033**<br>(.019) | -.039<br>(.025)   | -.027<br>(.029)   |
| <i>Dur. of Prot.-Cath. Conf.</i> | .006<br>(.011)              | .003<br>(.010)    | .008<br>(.011)    | .012<br>(.025)    |
| <i>Duration of Pogroms</i>       | -.191<br>(.246)             | -.347<br>(.228)   | -.623*<br>(.285)  | -.136<br>(.576)   |
| <i>Balkans Dummy</i>             | .532*<br>(.075)             | .509*<br>(.129)   | .333<br>(.213)    | .416**<br>(.232)  |
| <i>Eastern Europe Dummy</i>      | .513*<br>(.092)             | .422**<br>(.239)  | .204<br>(.329)    | .296<br>(.383)    |
| <i>Middle East Dummy</i>         | .250*<br>(.063)             | .253*<br>(.070)   | -.014<br>(.192)   | .040<br>(.218)    |
| $R^2$                            | .439                        | .478              | .586              | .616              |
| <i>No. of obs.</i>               | 52                          | 52                | 52                | 52                |

Note: \* and \*\* respectively denote significance at the 5 percent and 10 percent levels. Heteroskedasticity-corrected standard errors reported in all regressions. Dependent variable: religious fractionalization in 2001; source: Alesina et al. (2003). Source of conflict data: Brecke (1999). Source of population data: McEvedy and Jones (1978). Geographic dummy variables for Northern, Central, Western Europe, Asia, Africa, the Middle East and islands included in all regressions but now shown. Con-

trols for population, distance to equator, landlocked included in columns (2) through (4) but not shown. Population levels in 1000 and 1500, distance to Rome, Jerusalem and Mecca included in columns (3) and (4) but not shown. The average years of various categories of conflict included in column (4) but not shown.

We have thus seen that, with the exception of some of the geographic dummy variables that come in statistically significant, although not robustly to changes of empirical specification, only a few of the right-hand side variables, which we singled out above, have explanatory power. Despite this observation, the fit of the regressions, even of the baseline version, is quite high as indicated by the  $R^2$  measures.

We then ran the same regressions shown in Table A.8.1 but with ethnic and linguistic fractionalization, respectively, as the dependent variables. Though the direction of the effect of religious conflicts on fractionalization was generally maintained, the impact of the latter on ethnic and linguistic fractionalization is overwhelmingly insignificant. One exception was provided by the statistically significant and negative impact of the *duration* of Muslim on Christian conflicts on ethnic fragmentation and the negative and significant role of pogroms on ethnic fractionalization in some specifications.

Interestingly, the coefficient on the frequency of total confrontations now entered negatively in five of the eight specifications, with three of the five also being statistically significant. In particular, the dampening influence of *Total Conflicts* on ethnic fractionalization in one regression and its similarly negative impact on linguistic fractionalization in two other regressions contrasted with the insignificant role of conflicts generally in religious fractionalization.

None of the other explanatory variables provided an evidently strong predictor of either ethnic or linguistic fractionalization. As discussed above, our data reflect a higher degree of religious fractionalization than either ethnic or linguistic. Thus, the lower levels and variance of ethnic and linguistic fractionalization might in part account for our results not being as strong as those reported in Table A.8.1. Still, the effects of our explanatory variables on ethnic fractionalization present slightly stronger and more uniform results over various specifications than linguistic fractionalization. This should again be viewed in light of the fact that our data reflect less linguistic fractionalization than ethnically.

Could it be the case that religious, ethnic or linguistic fractionalization is very persistent over time as a result of which our main results reflect the effects of fractionalization on conflicts and not the other way around? In this, we are encouraged by numerous factors already discussed herein, including the fact that, with very few exceptions, the European continent presented relatively low levels of fractionalization in the medieval period. Moreover, the addition of regional controls ought to account for outliers such as the Balkans and the Iberian Peninsula before 1492.

All the same, we decided to rerun our empirical tests using a three hundred-year time lag between our fractionalization observations and the conflict data. In particular, instead of tracking the patterns, types and attributes of violent confrontations over the half millennium between 1400 to 1900 CE, we generated an alternative variant of the conflict variables which was based on data covering the two centuries between 1400 and 1600 CE. This yielded 502 total conflicts in the 52 countries in our sample—instead of the 953 over the 500-year interval.

Tables A.8.2 provides the results derived using this new sample but otherwise replicating the empirical specifications shown in Table A.8.1. By incorporating a longer time lag, we see in Table A.8.2 that the effect of wars on religious fractionalization are very much in line with—and in some cases, in fact, stronger—than using the entire period 1400 to 1900 CE. Not only are the  $R^2$  measures comparable if not better than those shown in Table A.8.1, but the three types of ecclesiastical conflict measures, *Muslim-Christian Conflicts*, *Protestant-Catholic Conflicts* and *Pogrom*, are statistically significant in nine out of 12 times and directionally always consistent with the Table A.8.1 results: Muslim on Christian confrontations that took place between the 15th and 17th centuries depressed the current-day religious fractionalization of countries, although only in the column (4) regression does the coefficient on *Muslim-Christian Conflicts* attain significance at the 10 percent level. By contrast, the Protestant on Catholic conflicts or Jewish pogroms that took place four centuries ago or earlier raised religious fractionalization, entering the four specifications always positively and significantly. For contrast, consider that *Muslim-Christian Conflicts*, *Protestant-Catholic Conflicts* and *Pogrom*, are statistically significant in only five out of 12 cases in Table A.8.1.

While other control variables are typically insignificant, the geographic dum-

mies for the Middle East, eastern Europe and the Balkans in some specifications are significant. And in terms of the duration of conflicts we again have some evidence that longer religious conflicts—in this case, *Duration of Pogroms* only—typically reduced religious homogeneity. In terms of quantitative effects, the results we obtain with this longer-lag data are still stronger: in column (4) for instance, a ten percent higher incidence of Muslim on Christian wars is associated with close to a ten percent decrease in religious fractionalization, the magnitude of which is larger than the range implied by the regressions covering the entire 1400 to 1900 CE time period.

**Table A.8.2:** Impact of Conflicts on Religious Fractionalization (1400 – 1600 CE)

| Dependent Variable:              | Religious Fractionalization |                   |                   |                    |
|----------------------------------|-----------------------------|-------------------|-------------------|--------------------|
|                                  | (1)                         | (2)               | (3)               | (4)                |
| <i>Total Conflicts</i>           | -.0003<br>(.003)            | -.002<br>(.003)   | .0003<br>(.007)   | .007<br>(.006)     |
| <i>Muslim-Christian Conf.</i>    | -.022<br>(.016)             | -.026<br>(.017)   | -.025<br>(.024)   | -.033**<br>(.018)  |
| <i>Protestant-Catholic Conf.</i> | .047*<br>(.021)             | .049**<br>(.023)  | .063*<br>(.035)   | .355*<br>(.072)    |
| <i>Pogrom</i>                    | .531*<br>(.154)             | .589***<br>(.155) | .683**<br>(.168)  | 1.64*<br>(.300)    |
| <i>Duration of Total Conf.</i>   | .016<br>(.011)              | .012<br>(.012)    | .013<br>(.012)    | -.028<br>(.021)    |
| <i>Dur. of Mslm-Chrst. Conf.</i> | -.010<br>(.017)             | -.002<br>(.015)   | .006<br>(.021)    | .043<br>(.027)     |
| <i>Dur. of Prot.-Cath. Conf.</i> | -.005<br>(.018)             | -.0001<br>(.017)  | .009<br>(.021)    | .001<br>(.025)     |
| <i>Duration of Pogroms</i>       | -9.48*<br>(3.62)            | -9.68*<br>(3.63)  | -9.57*<br>(3.767) | -385.3*<br>(72.16) |
| <i>Balkans Dummy</i>             | .444*<br>(.070)             | .415*<br>(.136)   | .275<br>(.230)    | .019<br>(.330)     |
| <i>Eastern Europe Dummy</i>      | .462*<br>(.069)             | .423**<br>(.172)  | .328<br>(.336)    | .077<br>(.382)     |
| <i>Muslim Majority</i>           | ...                         | ...               | -.179<br>(.178)   | -.363**<br>(.187)  |
| <i>Christian Majority</i>        | ...                         | ...               | -.142<br>(.117)   | -.278*<br>(.132)   |
| $R^2$                            | .455                        | .474              | .600              | .754               |
| <i>No. of obs.</i>               | 52                          | 52                | 52                | 52                 |

Note: \* and \*\* respectively denote significance at the 5 percent and 10 percent levels. Heteroskedasticity-corrected standard errors reported in all regressions. Dependent variable: religious fractionalization in 2001; source: Alesina et al. (2003). Source of conflict data: Brecke (1999). Source of population data: McEvedy and Jones (1978). Geographic dummy variables for Northern, Central, Western Europe, Asia, Africa, the Middle East and islands included in all regressions but now shown. Controls for population, distance to equator, landlocked included in columns (2) through (4) but not shown. Population levels in 1000 and 1500, distance to Rome, Jerusalem and Mecca included in columns (3) and (4) but not shown. The average years of various categories of conflict included in column (4) but not shown.

The results using only the period 1400 to 1600 CE exhibit similar tendencies to those where the entire period was in use. In particular, our conflict data aren't as powerful in explaining ethnic or linguistic fractionalization as they are in religious fractionalization. With this sample, *Total Conflicts* has a depressing effect in one specification with ethnic fractionalization as the dependent variable and it has such an effect in two regressions where linguistic fractionalization is the dependent variable. This is in clear contrast to the results with religious fractionalization, which do not yield any explanatory power to the overall level of conflicts in fractionalization. The one significant difference between these results vis-a-vis those reported in Table A.8.1 is that *Pogrom* has a statistically significant, positive impact on ethnic and linguistic fractionalization in seven of the eight specifications, whereas *Duration of Pogroms* has a negative and statistically significant impact on ethnic and linguistic fractionalization in six of the eight regressions shown. This effect is in line with those for religious fractionalization reported in Table A.8.1, but they are in contrast with those in Table A.8.2, where the impact of conflicts over the longer time horizon of 1400 to 1900 CE on ethnic and linguistic fractionalization is shown to be typically insignificant.

A four-century lag between measures of conflict and fractionalization provides us some comfort that we are distilling off any impact fractionalization could have on conflicts. Nonetheless, even a four century lag would not compensate for omitted variable biases inherent in the results above. This is why we controlled for the dates of independence in some alternative estimates and substituted more or less aggregated geographic controls for countries in Europe in various other regressions. Neither of these alterations influenced the essence



of our findings. Furthermore, for an empirical work whose key explanatory data cover the medieval era, our  $R^2$  measures are unusually high, exceeding .75 in some specifications where religious fractionalization is the dependent variable. This is another reason why omitted variable biases are probably not exerting a meaningful bias in the results.

For further empirical work and issues related to the material above as well as those in the next chapter, please see Fletcher and Iyigun (2009).