Forgiveness and crime dynamics: Empirical insights from the Catholic Jubilee Year custom

Yulia Neleptchenko

Department of Economics, University of Haifa, Yitzhak Rabin Complex, Haifa, 34998838, Israel

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ABSTRACT

This paper investigates the behavioural implications of the Catholic foremost religious event, called a Jubilee Year, on crime levels. During the celebration, a massive remission of sins is offered to Catholics, raising an interesting question: Do people commit more, fewer, or the same amount of crimes in the time-proximity to the event? The empirical study shows that Catholics committed fewer crimes during the event celebration in Europe. Observing Italian time series that included several Jubilee celebrations revealed particularly interesting patterns of crime behaviour around the event occurrence. Insights from detecting such patterns in the context of religious forgiveness could potentially hint at recurring themes emerging around secular amnesties. These possibilities will be discussed further in the course of the conversation.

1. Introduction

Religious doctrines are multifaceted complex concepts. Developed and polished over centuries, many of the present-day religions, including monotheistic, prescribe behavioural patterns to the faithful by defining the good and bad, for both the transient body and the eternal soul. A fulfilment of such spiritual recommendations by a substantial amount of believers can be detected by observing shifts in various socio-economic indicators, especially in the time-proximity of a major religious event occurrence.[1]

Email address: dryulianel@gmail.com (Yulia Neleptchenko)

[1]For instance, see Campante and Yanagizawa-Drott (2015) on impacts of Ramadan on productivity, economic growth and happiness, or Becker and Woessmann (2009) on effects of Protestant Reformation on human capital accumulation via literacy channel.

In this paper, a foremost Roman Catholic Church event called the Jubilee Year will be investigated. In particular, the impacts of the religiously prescribed behavioral aspects of the event-related customs on socio-economic outcomes will be evaluated. Such investigation is of interest because during the Jubilee celebration, Catholics are given an opportunity for a fresh spiritual start by obtaining forgiveness for sins committed previously, a Jubilee indulgence. The Jubilee remission of sins is offered to every Catholic. However, in order to obtain it, a few conditions apply. One of the requirements states that the forgiveness will be granted to the faithful who genuinely promise to detach from all sins *and* not to sin again. The current study purpose is to examine whether Catholics sinning patterns change around the Jubilee Year occasion. Criminal offences recorded will serve as a proxy for the amount of bad deeds committed.

The study will be conducted via two channels. The first path is to examine historical Italian time series data on crimes for a period of time during which eight Jubilee events were held. The second route is to perform a conditional analysis on a longitudinal data for European countries criminal activities count, recorded around the Great Jubilee of 2000 event, where predominantly Catholic countries to be considered under the treatment of the event and the rest of the countries in the sample to serve as a control group.

The rest of the paper is organized as follows. The next section outlines an historical and religious background on the Jubilee Year event's origins and the its relation to the remissions of sins, indulgences. Section 3 describes the dataset to be used in the analysis of the Italian crimes time series and examines the impacts of multiple Jubilee events occurred during the time period in focus. Section 4 presents the data used for examination of the Great Jubilee of 2000 influences on European countries criminal activities, elaborates on the empirical strategies adopted and details the results obtained. Concluding remarks are provided in Section 5. Appendix A contains supplementary tables for the empirical estimation alternative specification discussed in Section 4.

2. Historical and religious background

2.1. Indulgences

Indulgences are an ancient Catholic custom of offering a cancellation of the temporal punishment due to sin in the next life in exchange for good works in this life. This custom is practised, with some modifications over time, since the eleventh century.[2] The Catechism of the Catholic Church defines: "An indulgence is a remission before God of the temporal punishment due to sin whose guilt has already been forgiven, which a faithful Christian who is duly disposed gains under certain prescribed conditions through the action of the Church, as the minister of redemption, dispenses and applies with authority the treasury of the satisfaction of Christ and the saints."[3] "An indulgence is partial or plenary according as it partially or wholly frees a person from the temporal punishment due to sin."[4]

A *modus operandi* of such remission can be described as the following: A person who is interested in obtaining an indulgence has to be baptised, not excommunicated, and in a state of grace. The state of grace, in turn, requires a sacramental confession and a full further detachment from all, even venial, sins.[5] After a wholehearted confession is made by the believer and the forgiveness is granted by the confessor, the connection between the faithful and Christ is renewed, allowing him/her to override the sins temporal punishment in the Purgatory using the Church's infinite treasure of merits.[6] Being truly repentant and detest the sin is a crucial condition to obtain an indulgence, as it "cannot be acquired

[2]A full historical background on the evolution of indulgences can be found in dal Cavolo (1999).

[3]Catechism 1471, Code of Canon Law canon 992, Indulgentiarum Doctrina norm 1.

[4]Ibid. 1471, canon 993, norm 2, respectively. A "temporal punishment" here is the time to be spent in Purgatory, as opposed to the "eternal punishment" of hell. See Catechism 1472 on this matter.

[5]Cf. John Paul II (1999) general audience, citing Enchiridion Indulgentiarum. A complete list of the conditions required for the plenary indulgence, including an Eucharistic Communion and Prayers for the Pope intentions, can be found in Indulgentiarum Doctrina, norm 7.

[6]Cf. Catechism 1476-1479 and/or Indulgentiarum Doctrina Chapter 1.3. This treasure is related to a concept of the economy of Salvation, also called the Divine economy or an economy of Revelation. See Catechism 1103 and Mirus (2009) interpretation, for instance.

without a sincere conversion of mentality".[7] Every person is assumed to be a sinner, and in need for forgiveness at all times.[8] The Holy See is the only authority to grant indulgences, during special occasions/times declared by the Supreme Pontiff.[9,10] In Economics terms, all mentioned above makes the Catholic Church a monopolistic supplier of a particular religious service, a remission of sins, available exclusively to the followers of the Church, the Roman Catholics.

Indulgences played an important, if not to say crucial, historical role in shaping what we know today as modern Europe. Until the sixteenth century, indulgences were sold by the Catholic Church for profit and the concept was widely abused.[11] *Quaestores*,[12] who were officially entitled to collect the alms-givings for indulgences, went way beyond the bounds of reason collecting the funds. The abuse was so significant that it led Martin Luther to raise a question about the legitimacy of indulgences and the Pope's authority over the punishment in the afterlife. On October 31, 1517, Martin Luther nailed his "Ninety-Five Theses or Disputation on the Power and Efficacy of Indulgences" on the door of the University of Wittenberg, inviting the Catholic Church to a theological dispute. This event started a second, Lutheran, schism of the Roman Catholicism, known as Reformation.

Martin Luther and the Holy See did not reach a consensus on indulgences. On the contrary, with time more and more theological differences widened the division between

[7] See Indulgentiarum Doctrina, Chapter 4.7, 4.8 and 4.11. Beer (1978), in his theological study, suggested that the intensity of the sorrow a sinner feels determines the "quality" of the indulgence obtained. This degree of devotion can be known only to God.

[8] Indulgentiarum Doctrina, Chapter 1.3, based on earlier sources.

[9] Code of Canon Law, canon 995.

[10] The Church "condemns with anathema those who maintain the uselessness of indulgences or deny the power of the Church to grant them", Indulgentiarum Doctrina, Chapter 4.8.

[11] For instance, the Saint Peter's Basilica in Rome was rebuilt from funds raised by selling a special indulgence, which obsoleted many serious sins, including theft and adultery. Another example is a "Butter Tower" of Rouen Cathedral built from monies collected for a special indulgence, which allowed eating butter during Lent. On the other hand, many churches, hospitals, leprosariums, bridges, roads and schools were built/renovated from funds collected by selling indulgences. See dal Cavolo (1999) for reference.

[12] "Pardoners" in Latin.

the Roman Catholics and the Lutherans. Luther was excommunicated in 1521, but the revolution he started continued, causing religious wars in practically all European countries. The Church had reacted with Counter-Reformation, also called a Catholic Reformation or a Catholic Revival. During the Council of Trent (1545-1563), it restated all Catholic postulates and rejected any compromise with the Protestants. On the other hand, the practice of granting indulgences was modified; financial transactions related to indulgences were strictly forbidden in 1567, and all those who trafficked in indulgences were excommunicated by Pope Pius V in 1569.[13] An additional impact of the Catholic Reformation was the beginning of extensive patronage of artists who glorified the Catholic God through architecture, painting, sculpture, and music, leading to the establishment of Baroque art. Bernini, Rubens, Titian, El Greco, van Dyck, Rembrandt, among others, belong to a group of Counter-Reformation painters and sculptors. The Gregorian calendar was adopted during the Catholic Revival as well. Nonetheless, the division caused by Luther was irreversible. Inflamed by the abuse of the concept of indulgences, it created a religious shock to be studied by social scientists, including economists, centuries later. The influential book of Max Weber (1905), "The Protestant ethics and the spirit of capitalism", spurred an outburst of an empirical research focused on the socio-economic benefits of the Lutheran schism for the Protestants versus Catholics.[14] In Economics, *nemine contradicente*, i.e. an investigation on how the aspects of the Roman Catholic doctrine could benefit (or not) the Holy See followers after the Reformation, was never conducted.[15]

Upon closer examination of Luther's writings, it becomes clear that his theses can be

[13]See Beer (1978), inter alios, for reference.

[14]See, for instance, Becker and Woessmann (2009) on literacy, that led to an economic prosperity via the education channel, Blum and Dudley (2001) on lower cooperation costs and Ekelund, Hebert and Tollison (2002) on more religious competition.

[15]The authors are not aware of research where any aspect(s) of the Catholic faith, or its' consequences, found preferable versus the Protestant or any other religious doctrine/secularism. In inclusive studies for all religions, Catholics usually served as a control group, being the largest religious denomination in the sample.

divided into two categories. The first category addresses the issues related to the Roman Catholic Church as a provider of the indulgences religious product, while the second category offers guidance on the product's advantages/disadvantages to the targeted consumers of indulgences, the Christians. The latter category is particularly prominent in theses 42-51, which begin with: "Christians are to be taught..." From an economic perspective, this division identifies and separates the monopolistic supplier of a particular religious service (indulgences), or the Church, from the aggregated demand dimension, the Christians. The supply side of this market is criticized based on the Church's (possible) inability to deliver the forgiveness promised, the high prices charged for the product, and the underlying motivation of the Church as a religious authority to make monetary profits rather than care about its flock's souls. The consumers, or Christians, are instructed (and warned) about the potential flaws of the product and the possible negative spillovers from the consumption of indulgences, especially when frequently repeated. According to Luther, freeing the faithful from future penalty does not make man better.[16] On the contrary, the underlying hypothesis is that obtaining forgiveness for sins on Earth, whenever desired, would make a person more of a sinner. That is, the occasional forgiveness for sins, and the following nullification of the afterlife punishment, would inflate the very concept of God's judgement and alleviate the fear from it.

This study will examine empirically the impacts of the indulgences, massively granted during the Jubilee Years to Catholics, on sinning patterns, proxied by the criminal behaviours of the faithful, in the time-proximity to the event, while the underlying hypothesis is that more crimes are expected to be observed during the event or right after the event is over.

[16]Thesis 44: "Because love grows by works of love, man thereby becomes better. Man does not, however, become better by means of indulgences but is merely freed from penalties."

2.2. A Jubilee Year custom

A Jubilee Year is a Catholic Church event celebrated in Italy every twenty-five years, or more frequently, since 1300 AC.[17] If the Jubilee falls on a round twenty-fifth year, it is considered planned, or ordinary. Additionally, the Pope can declare an extraordinary Jubilee(s), which can be held any time, commemorating a special occasion, and vary in length. For the faithful, the ordinary Jubilees are expected events, as opposed to extraordinary and unexpected, in terms of religious policy-making intervention. During this year, when declared by the Holy See, all the Catholics are invited to participate in the celebration, obtain forgiveness for sins committed previously and obsolete all the temporal punishment due to sin via a channel of the special plenary indulgences.

The Jubilee concept was first mentioned in the Book of Leviticus (25, 10-14) as a year during which all the slaves and prisoners should be freed, debts to be forgiven, lands returned to original owners and mercies of God ubiquitously manifested.[18] The main purpose of the event is to offer all Catholics a grant of cancellation of punishment due to sin.[19] The Catholic Church explicitly ties the Jubilee Year custom with indulgences to mark a "new beginning in the love story between God and men" and offers a smooth path "to burn away sin and leave the past behind".[20] Nevertheless, the Jubilee indulgences differ from other indulgences, as they have to obey the specifics of the Jubilee Year ritual. In addition to confession, detachment from all sins, communion and prayers for the Pope's intentions, the faithful must pass via a Holy Door in places designated by the Church. Such Holy Doors are opened on Christmas evening and sealed the day after the following Epiphany,

[17]The first Jubilee Year was declared by Pope Boniface VIII. Dante Alighieri, spotted between the pilgrims of the First Jubilee, mentioned it in his "Divine Comedy", Canto XXXI of Paradiso.

[18]Cf. Vatican official site, Jubilee 2000 documents.

[19]Pope John Paul II (1999) starts his general audience with: "...In close connection with the sacraments of Penance, our reflection today turns to a theme particularly related to the celebration of the Jubilee: I am referring to the gift of the indulgences, which are offered in particular abundance during the Jubilee Year..."

[20]See dal Cavolo (1999).

causing the length of the event to align almost perfectly with annually recorded data and making empirical research on Jubilee Year impacts more precise.[21] Historically, the Doors were located exclusively in Rome,[22] in order to create an influx of pilgrims who would purchase the indulgences, donate to the Church and contribute to the local tourism-related businesses during the event. However, the Great Jubilee of 2000 was planned, and executed, as a planetary event with a significant simplification of rites, including a recognition of the doors of the local basilicas and churches as the Holy Doors, for the purpose of the Jubilee indulgences bestowal.

2.3. The Great Jubilee of the year 2000

For the Holy See, a beginning of the new millennium had created a perfect opportunity to extend the scale of the Jubilee celebrations worldwide.[23] Such a special occasion required an appropriate preparation of the faithful and the Church. On November 10th, 1994, the Pope John Paul II published a special apostolic letter *"Tertio Millennio Adveniente"* ("As the third millennium approaches"), calling all the Catholics to spiritually prepare themselves, over three years, for the journey into a new millennium. Fitting the Trinitarian approach, the three years preceding the Great Jubilee of 2000 were devoted to the Son (1997), the Holy Ghost (1998) and the Father (1999).

Italian civil authorities also took appropriate measures to ensure readiness. The provincial plan of investments was approved as early as four years prior the event, in 1996. It

[21] A full description of the modern procedure of opening/closing the Holy Doors can be found in the Vatican official site liturgy documents. Visualization of a medieval Holy Door opening can be obtained by watching the historical series "Borgias", season 3, episode 8, where the Pope Alexander VI opens the Jubilee of 1500. His intention was to collect alms-givings from selling indulgences to fund a crusade against the Turks. Interestingly, a full price-list for different sins to indulge is presented there.

[22] In four patriarchal basilicas: Saint Peter, Saint John Lateran (or Most Holy Saviour at the Lateran), Saint Mary Major and Saint Paul on the Ostian Way (or Outside the Walls). Additional locations include: the Basilica of the Holy Cross in Jerusalem, the Basilica of Saint Lawrence in Campo Verano, the Shrine of Our Lady of Divine Love and the Christian Catacombs. See the Apostolic Penitentiary's "The gift of the indulgence" by Cardinal Baum (2000) for reference.

[23] In 2000, the Roman Catholic Church had approximately 1.2 billion followers all over the world.

included more than eight hundred projects, priced jointly for almost 1.9 billion euros. Most of the funds were allocated to infrastructure enhancement, including the improvements of the rail-road and roads, adjustments at Rome-Fiumicino Airport, creation of parking lots, and more. A smaller fraction of the budget was assigned to the maintenance of public areas, preservation of cultural assets and security. Besides the public funds invested by the provincial authorities, non-negligible private investments were made, especially in the tourism-related businesses. In total, the private and public investments in the preparations to the Great Jubilee of 2000 amounted to approximately 6.5 billion euros, or 10 percent of the annual regional GDP.

When the year 2000 had finally arrived, the celebrations took place simultaneously in Rome, in the Holy Land and in dioceses and other ecclesiastic territories all over the world. In Rome only, more than eight million Catholics participated in the meetings with the Holy Father, at different audiences, ceremonies and Angelus. 1.6 million Catholic youth were hosted during only two days (19-20 of August) of the World Youth Day. The total number of the pilgrims-visitors to Rome in 2000 was estimated, by different sources, to lie between 24.5 million people to 32 million.[24] The Italian National Institute of Statistics and the Bank of Italy reported that the total amount of nights spent in Rome by the tourists rose from 17 million in 1999 to more than 24 million in 2000, and the international tourism expenditure increased by twenty percent, from 4.8 billion Euro in 1999 to 5.8 billion Euro in 2000.[25]

Remarkably, the pilgrims-visitors travelled to Rome despite the fact that this pilgrimage was not necessary any-more for obtaining the Great Jubilee plenary indulgence, because the requirement to pass via the Holy Doors of Rome basilicas was simplified and replaced with an option of pilgrimage to a locally designated church. Moreover, the pilgrimage itself became an option, among few others, to obtain the remission of sins. After fulfilling the basic conditions

[24]See Brunelli and Trecart (2000) for details.
[25]Cf. Bronzini et.al. (2020).

for a plenary indulgence,[26] the faithful could choose one of the three categories of good works to perform. The first category, works of piety or religion, included a pious pilgrimage or a visit to a Jubilee place. The second option required works of mercy or charity, in particular visiting brothers/sisters in need, or supporting by a significant contribution works of religious or social nature, or to devote a personal free time to benefit the community. The third alternative is to perform acts of penance for at least one whole day, such as an abstention from unnecessary consumption of smoking and drinking, or fasting, or an abstention from meat *and* a donation to the poor.[27] Given a wide range of choice between the charitable giving/volunteering, abstention/fasting and a visit to a Jubilee place, no Catholic was left behind without a suitable option to obtain a Great Jubilee indulgence. Economically speaking, the "price" of participation in the event was reduced from a mandatory pilgrimage to Rome in order to pass via the Holy Doors to an array of options to choose from, affordable to all the Catholics.

At the end of the year 2000, the Holy See celebrated the success of the Great Jubilee, emphasizing a massive involvement of the Catholics in the related ceremonies. To conclude the celebrations, the Pope John Paul II published another apostolic letter, *"Novo Millennio Ineunte"* ("At the beginning of the new millennium"), in which he outlined the priorities of the Church for the third millennium. As of the Great Jubilee, he found it "... impossible to take the measure of this event of grace which in the course of the year has touched people's hearts." In the next sections, an attempt to quantify the impacts of the event, at least in the dimension of criminal activities, will be made.

[26]Being in a state of grace, confessed, received the Holy Communion and interiorly disposed to detach from all sins. See Apostolic Penitentiary's documents on Vatican official site on this matter, published by Cardinal Baum (2000).

[27]Ibid., 8-10.

3. Italy Case

3.1. Italian historical time series datasets on crimes and religiosity

To observe the 150^{th} anniversary of the unification of Italy, the Italian National Institute of Statistics (ISTAT) has collected and made publicly available a significant amount of historical data sets, including crimes. The dataset on illegal activities contains all the violations of the criminal code, as was reported to the law enforcement authorities, per annum, and per hundred thousand inhabitants, by known and unknown perpetrators. All the reports opened from January 1^{st} to December 31^{st} were counted in the same calendar year. The categories of crimes include homicides, battery *and* culpable injuries, offences, slanders *or* libels, thefts, robberies, extortions, kidnappings for robbery or extortion purposes, swindles *or* other frauds, violence/resistance to public officer, financial embezzlement, misappropriation, bribery, dereliction of duty, and more. All crimes were assigned an equal weight in the total crimes recorded data sample, that spans over 126 years, from 1888 to 2013. Figure 1 illustrates the evolution of crime levels in Italy. The dashed vertical lines refer to the eight Jubilee Years events held during this period, while the gray-shaded areas indicate wartimes.

In Italy, the period of time between 1888 and 2013 was rich with historically meaningful episodes. Changes in the political regime from monarchy to fascism to a republic, the two World Wars and the financial crisis of 2007-2008, among other events, caused prolonged periods of political instability and/or social unrest and created violent environments. This, in turn, impacted many socio-economic indicators, including criminal activities records.

As one can immediately notice from the graph, the time series of Italian historical crimes could be roughly divided into two parts: before the year 1970, and after. The first sub-period of the time series exhibits a relatively low level of criminal activities and moderate volatility,[28] with no clearly pronounced trend, while the second sub-period has an upward

[28]Excluding the wartimes: WWI of 1914-1918 and WWII of 1941-1948, including post-war stabilization

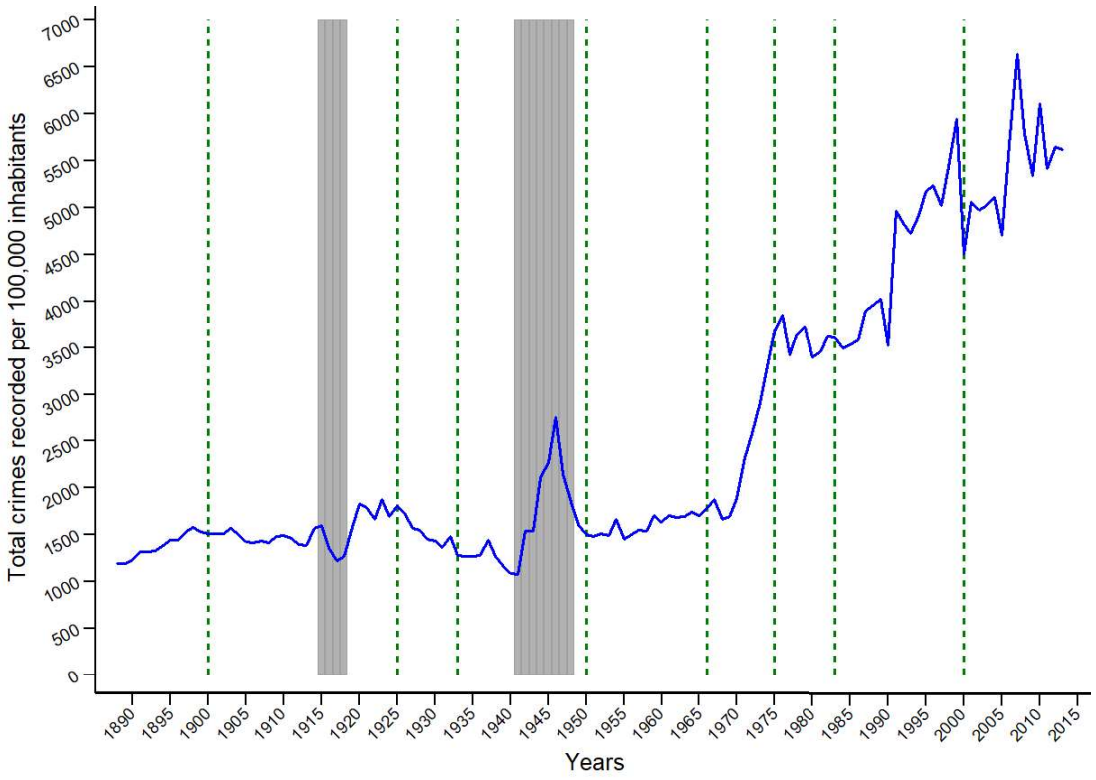


Figure 1: Criminal activities in Italy, years 1888-2013.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

trend and is more volatile. Such a division could be justified by the beginning of a very violent period in Italian history that started in early 1970*s* and called "The Years of Lead". To determine precisely the year a structural break in the time series pattern occurred, two statistical tests were performed.[29] A Supremum Wald test with unknown in advance structural break date suggested the year of 1972 as a switching regime point, with a statistic of 179.91 and a *p-value* of zero.[30] Performing the test on the same year of 1972, as if it was the known/suspected structural break point led to a statistic of 148.47 and a *p-value* of zero as

period, where the drop and the spike are observed, respectively.
[29]Post estimation tests, after a regression of crimes levels on years.
[30]15% default edges trimming, no constant.

well. Based on the results of both tests, the time series to be divided into two sub-samples, covering years of 1888-1971 and of 1972-2013, respectively, and analysed in the following two sub-sections separately.

During the sampled time period, eight Jubilee Years were celebrated in Rome: five ordinary, or planned, and three extraordinary. As customary, the ordinary Jubilees were held every twenty-five round years: in 1900, 1925, 1950, 1975, and 2000.[31] The extraordinary Jubilees marked the specific events the Church found significant to give a reason for an additional celebration. In 1933 and 1983, two Jubilees commemorated the 1900^{th} and 1950^{th} anniversaries, respectively, of Jesus death and resurrection. In 1966, the post-Vatican II Council Jubilee Year concluded the most important ecumenical event of the Roman Catholic Church in the 20^{th} century.

Despite the multiple celebrations calling upon the faithful to reunite with the Church, the Roman Catholic share in the overall Italian population had declined, steadily and slowly, from 97.81 percent in 1888 to 78.34 percent in 2013.[32] This prolonged deterioration, together with the rise of other religious and secular denominations, is shown in Figure 2. A forecast on the future development of the largest religious/secular groups in Italy is projected until the year 2050. By looking at Figure 2 we do not observe sudden shifts or kinks that could be associated with the Jubilee Years, as no such change(s) occurred from 1950 to 2000.

While the count of Catholic shares provides an insight on the percentage of Italians formally associating themselves with the Roman Catholic Church, investigating how affiliations impact beliefs and are translated to behaviours, could be of help. Table 1 summarizes Italian

[31] A detailed description of the ordinary Jubilees of the 20^{th} century can be found on Vatican official website, Jubilee of 2000 magazine documents. The Great Jubilee of the year 2000 could be seen as extraordinary in terms of the extent of the event, as a first planetary Jubilee.

[32] The source of the continuous religious shares data is the Association of Religion Data Archives (ARDA), Religious Characteristics of States Project dataset. See Finke and Adamczyk (2008) for reference.

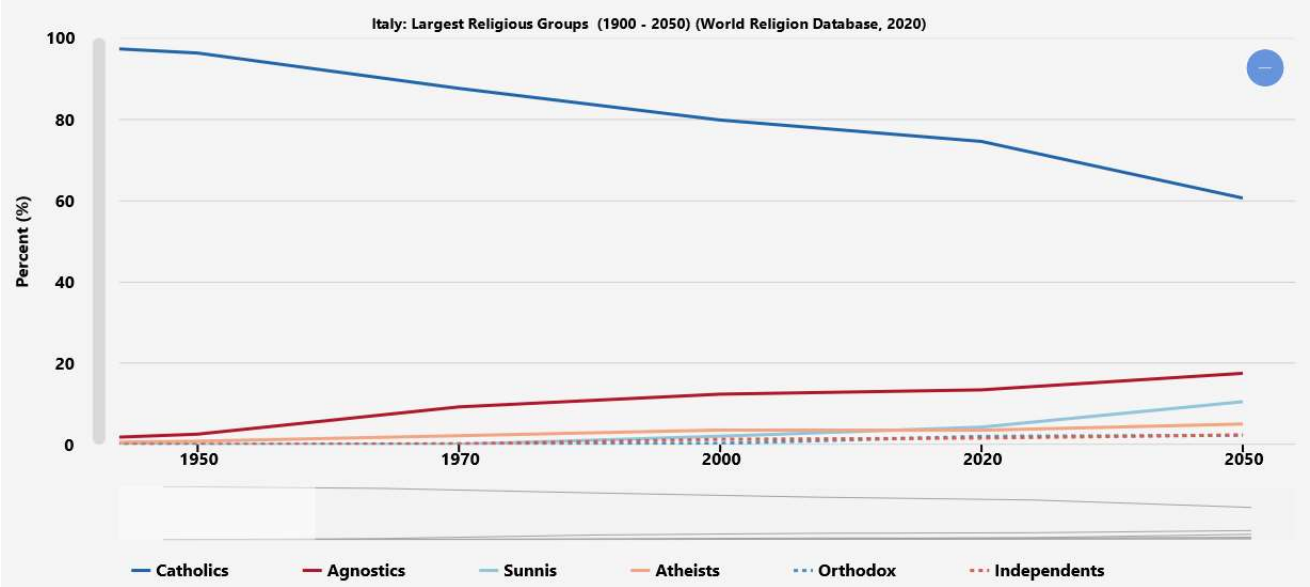


Figure 2: Growth of religious shares in Italy over time.
Source. Association of Religion Data Archives (ARDA), "World Religion," accessed April 16, 2024, National Profiles - Italy.

public opinion surveys on religiosity, conducted by the World Values Survey (WVS).[33,34]

The World Values Survey distributes questionnaires and collects answers, related to values, to/from hundreds of thousands of people of different nationalities. Each wave of the survey covers a distinctive set of countries. As such, the data reported for the Italian public opinion, in Table 1, has gaps and/or missing observations. Nonetheless, it sheds light on many religiosity aspects and their recent developments. While belonging to the religious denominations declines, the religious beliefs seem to rise in all categories, together with the importance of religion, the confidence in religious organizations and the feeling of comfort found in faith. In the study on the impacts of the Jubilee event, the survey answers regarding believing in the existence of afterlife and the concept of sin are of particular interest. As shown in Table 1, a significant percentage of the modern Italian population shares the

[33]The survey is relatively recent.
[34]This table indicates opinions of all Italians, Catholics and non-Catholics. If Catholics only answers to be extracted from the survey, all the numbers reported are slightly higher.

Table 1: Italian public opinion on religious matters.

Italian Public Opinion	1981	1990	1999	2005
Religious Affiliation/Identification				
Percent belonging to a religious denomination	93.6	85.2	82.2	–
Percent identifying as a religious person	85.8	86.3	85.8	88
Religious Behaviours				
Percent attending religious services at least once a month	51.5	53.1	53.6	54.2
Percent meditating or praying	73.2	75.5	78.9	77.7
Religious Beliefs				
Percent believing in God	89.4	90.7	93.5	–
Percent believing in heaven	48.3	53.9	58.7	–
Percent believing in hell	37.4	41.9	49	–
Percent believing in life after death	58.6	68.1	72.8	–
Percent believing in a concept of sin	69.4	73.2	73.2	–
Percent believing church gives answers to people's spiritual needs	59.7	71.6	72.4	82.5
Percent believing church gives answers to moral problems	51.1	54.4	61.8	64.2
Religious Experiences				
Percent finding comfort and strength from religion	67.3	71.4	71.5	–
Attitudes				
Percent considering religion important	–	70.1	72.1	76.2
Percent confident in religious organizations	60.7	63	67	74.8

Source. Association of Religion Data Archives (ARDA), "World Values Survey," accessed April 16, 2024, Questions/variables on surveys - Italy.

Catholic Church official doctrine postulates on these matters.

3.2. Italian crimes before 1972

The total crimes data for the first sub-sample, covering eighty-four years, is plotted in Figure 3. Similarly to Figure 1, the five Jubilee Years of the sub-period are marked by the green dash-dotted vertical lines and the wartimes are gray-shaded. The solid red horizontal line indicates the sub-sample mean[35] and the two surrounding, from above and below, red dashed lines delineate the confidence interval of 95% from the mean. In terms of the two World Wars, Italy participated in World War I, from 1915 to 1918, and World War II. Right after WWI, Benito Mussolini came to power in 1922 and remained a dictator of Italy until 1943.

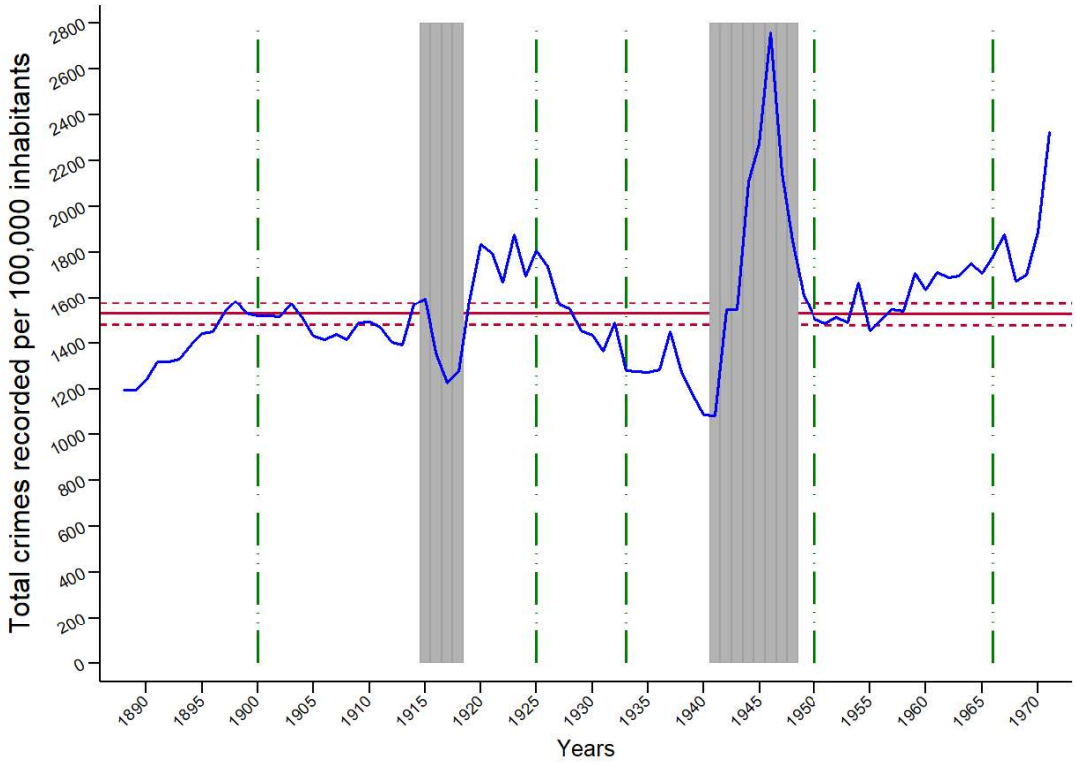


Figure 3: Total crimes in Italy, years 1888-1971.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

[35]Excluding wartimes.

WWII-related period includes not only the years of war itself, from 1941 to 1945, but also three post-war stabilization years, from 1946 to 1948. The sharp increase at the very end of the sub-sample is related to the beginning of the next criminally unstable period of Italian history called "The Years of Lead".

By looking at the graph, one could discern, by visual inspection, that in three out of five Jubilees (1900, 1933, and 1950) the time series remain constant right after the events, decline in one case (1925), and increase in one case (1966). After the detected periods of stability, a visible increase occurred. To clarify this observation, Figure 4 plots the first difference for crimes levels depicted in Figure 3, including its' mean and the 95% confidence interval. Figure 4 shows that there were no statistically significant changes in crime levels following years 1900, 1933 and 1950. As shown by the graph, after the years 1900, 1935 and 1950, the

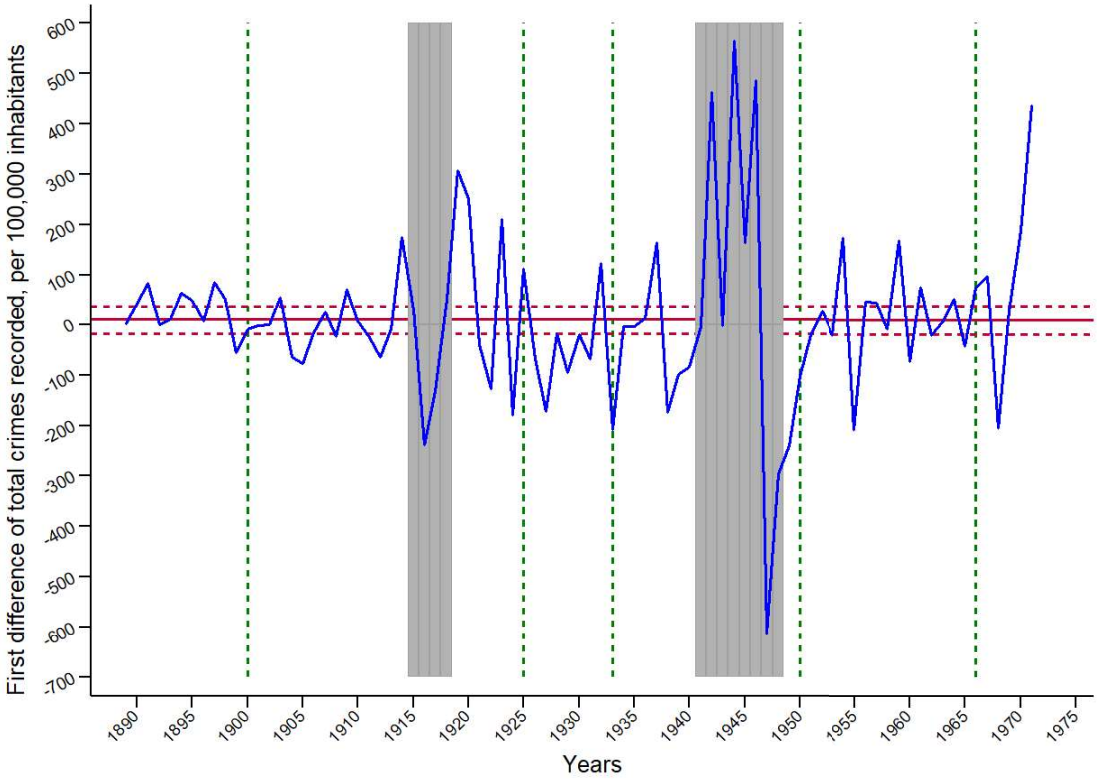


Figure 4: First difference of total crimes in Italy, years 1888-1971.

first difference remained inside the confidence interval for three years, suggesting that the changes in crimes levels were not statistically different from zero. This, in turn, provides an evidence of the series being constant. Moreover, these are the only periods of such prolonged stability over the sub-sample. Zooming-in at each Jubilee and analysing the events locally and separately, could provide valuable insight. Following the approach of technical analysis, used for financial data, a search for patterns will be conducted in the next paragraphs, where the Jubilees and their preceding/following years are to be discussed. In all the graphs to follow, the red horizontal lines will indicate local means and their 95% confidence intervals.[36]

3.2.1. The Jubilee Year of 1900

The Jubilee Year of 1900 was announced by His Holiness Leo XIII after the ordinary Jubilees of 1850 and 1875 were not celebrated.[37] The relevant Papal Bull was promulgated in May 1899 and supported by King Umberto's Disclose of the Crown before the Italian Parliament in September 1899. Figure 5 provides a close-up on ten years of criminal activities around the Jubilee Year of 1900.

As displayed by the figure, the crimes dropped in 1899, ending the previous positive trend. A local upward trend, started from the beginning of the sample in 1888, is clearly seen in Figure 3. The criminal offences count pattern observed around the Jubilee has a "two-towers" shape, with two spikes separated by three years of relative stability. Such a pattern is familiar from the technical analysis of the financial data, known as a "double-top". In the double-top trading pattern, two peaks are segregated by a "neckline", an interval with a relatively low and stable price level.

The technical analysis is a time series method investigating dynamic patterns in time

[36]Each time the mean to be computed locally around the event. The confidence interval related to the mean is 1.96 times the standard deviation/square root of the number of observations. The number of observations taken into consideration will refer to the amount of years mentioned in the caption of each figure, which is about 10 years.

[37]For political instability reasons, see Scalzotto (2000), Vatican official documents, for reference.

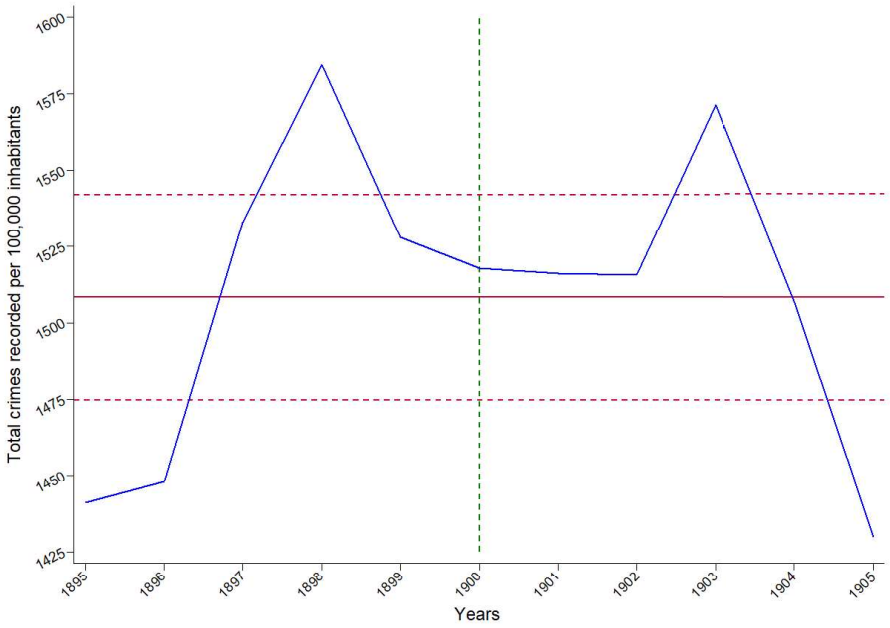


Figure 5: Total crimes in Italy, years 1895-1905.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

series behaviour.[38] It has been designed and routinely applied to financial data. In this paper, a new application of the technical analysis to crimes time series is proposed and implemented, as a part of a religious event study, where the crimes levels are measured annually at the country level and considered a macro indicator. The novelty of this finding is that the pattern detected lasts for at least five years, as opposed to the transient existence of the financial data patterns, commonly observed during the daily trading, allowing for optimization of law enforcement and other related policies, if desired. Moreover, the pattern of criminal activities levels formed around the event in focus could be explained by the nature of the religious policy shock that caused the pattern to occur in the first place. For the Jubilee of 1900 case, the first peak on the left side could constitute a last part of the

[38]For reference, see Colby's (2003) "Encyclopaedia of technical market indicators" or "International encyclopaedia of technical analysis: A - Z" by Siegel et.al. (2014).

previous local upward trend, and to not belong to the Jubilee-related pattern. From the year of 1900 and until the end of 1902, the vices levels remained relatively steady and rose again in 1903, compensating for the previous stability. Such behaviour over time of criminal activities is difficult to explain by other than Jubilee impacts, as no major event(s), that could cause crimes first to drop, then remain stable for a short period of time and rise again, occurred in Italian history at the very beginning of the 20^{th} century. If the Jubilee-related indulgences are the reason for the flatness in crimes levels detected around the Jubilee Year of 2000, detachment from all sins required for obtaining the plenary Jubilee indulgence and the promise not to sin again could cause the stability observed. After three years of partial abstention from bad deeds, some of the postponed crimes were executed, creating a one-time peak. Interestingly, the decline in crimes per 100,000 citizens in 1899 was (56.47), while compensation in 1903 accounted for 55.68 crimes, a number that is very close in absolute value to the reduction count.

3.2.2. The Jubilee Year of 1925

The Jubilee Year of 1925 celebration aligned with a beginning of a local downward trend in criminal activities, that continued until 1931. This trend is visible in Figure 6. Three years prior to the Jubilee, in 1922, Benito Mussolini came to power, establishing his dictatorship to endure until the year 1943. A longer-lasting downward trend, excluding the years surrounding the next Jubilee of 1933, is observed in Figure 3, persisting until the beginning of WWII. It is difficult to determine if the Jubilee of 1925 event is responsible for the start of the downward trend in crimes, or, perhaps, the fascistic regime of Mussolini had implemented more severe prosecution measures against the criminal offences, effectively causing the criminals to partly cease their activities. Except for these two possible explanations, no other meaningful occasion, that could create a downward local trend in criminal behaviours, is documented in Italian history. The double-top pattern observed around the Jubilee Year

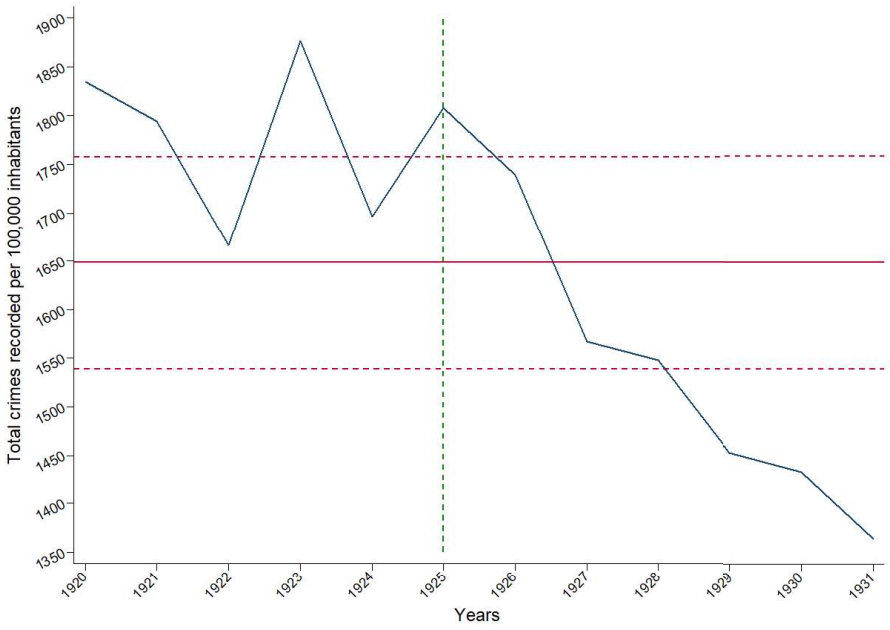


Figure 6: Total crimes in Italy, years 1920-1931.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

of 1900 is not detected here.

3.2.3. The Jubilee Year of 1933

The Jubilee Year of 1933 was extraordinary in the sense that it started on April 2^{nd}, 1933 and ended on April 2^{nd}, 1934. In this case, the data on crimes, recorded over a calendar year, does not fully coincide with the timing of the event. The behaviour of crimes recorded, for ten years around the event, is depicted in Figure 7. Similarly to the Jubilee of 1900 graph in Figure 5, the crimes mimic the double-top shape, with two spikes separated by three years of relative stability. The second, compensation, peak, brings the crimes back close to the level prior to the event's start. Contrary to the Jubilee of 1900 case, the pre-Jubilee of 1933 peak's left side could not be accounted as a part of a previous trend, hinting that more crimes could be committed intentionally right before the event's initiation, in order to obtain the

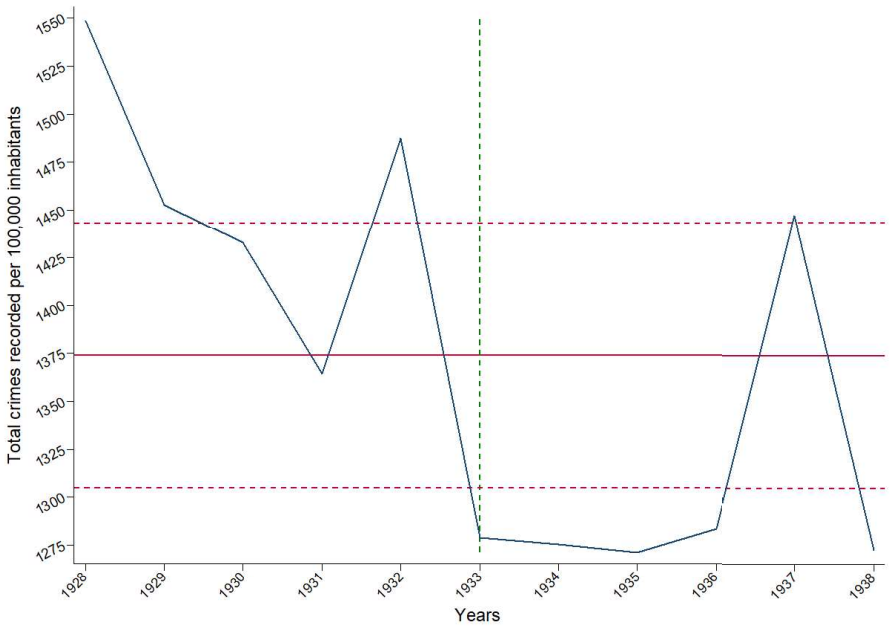


Figure 7: Total crimes in Italy, years 1928-1938.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

forgiveness later on.

3.2.4. The Jubilee Year of 1950

The Jubilee Year of 1950 was celebrated right after the post-WWII stabilization period, which ended in 1948. The behaviour of criminal offences count around the event is illustrated in Figure 8. The shape of the pattern observed resembles very much the double-top structure detected around the Jubilees of 1900 and 1933, with the left side of the first peak obscured by the strong downward post-war trend.[39,40] The criminal constant crime rate period lasted

[39]Can be seen in Figure 3. The years prior to 1949 are not shown in Figure 8 because significantly higher amounts of crimes recorded in 1941-1948 would rescale the graph and vague the pattern around the Jubilee of 1950.

[40]With regards to the kink in Catholic shares documented by Figure 2 in 1950, the percentage of Catholics in the total Italian population changed from 95.98% in 1949 to 96% in 1950, and further to 95.56% in 1951. In terms of slopes of the curves involved, the shares were almost stable right before 1950 and declined by approximately 0.5% a year from 1950 onward. For the event's impacts studied, such a change is insignificant

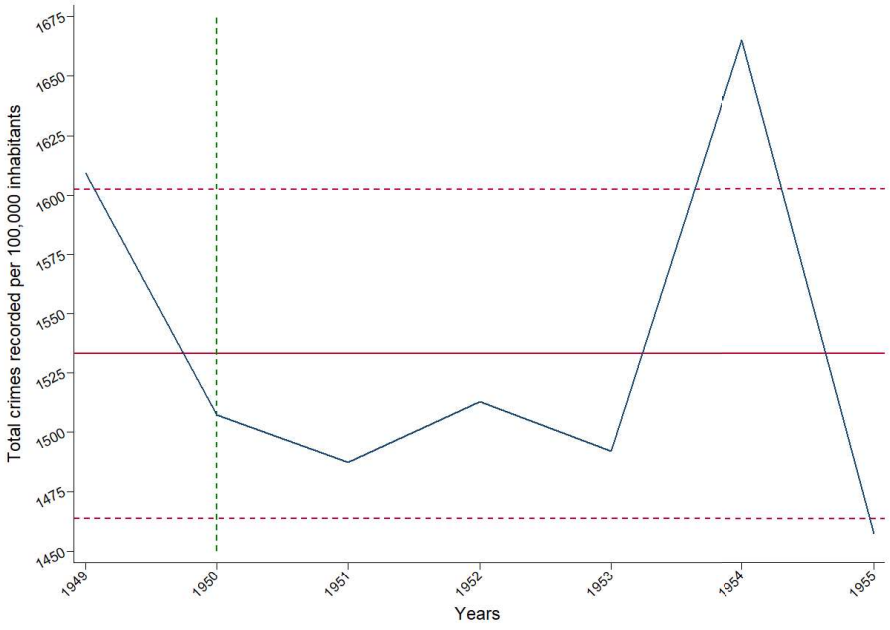


Figure 8: Total crimes in Italy, years 1949-1955.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

for three years, from 1951 to 1953, then a sharp one-time jump occurred. In this case, the second, compensation, spike exceeds in height the pre-Jubilee year count.

3.2.5. The Jubilee Year of 1966

The Jubilee Year of 1966 concluded the events of the Vatican II Council and was declared twice. At first, Saint Pope Paul VI declared the Extraordinary Jubilee of 1966 to last from January 1^{st} to May 29^{th}, while the announcement was made on December 7^{th}, 1965. On May 3^{rd}, 1966, a decision was made to extend the Jubilee until December 8^{th}. The crimes recorded pattern around the Jubilee of 1966 is depicted in Figure 9. The right tail of the data plot indicates the beginning of the violent "Years of Lead", effectively impacting the wideness of the confidence interval. The double-top structure, observed around a few previous Jubilees,

to alter the results of the analysis.

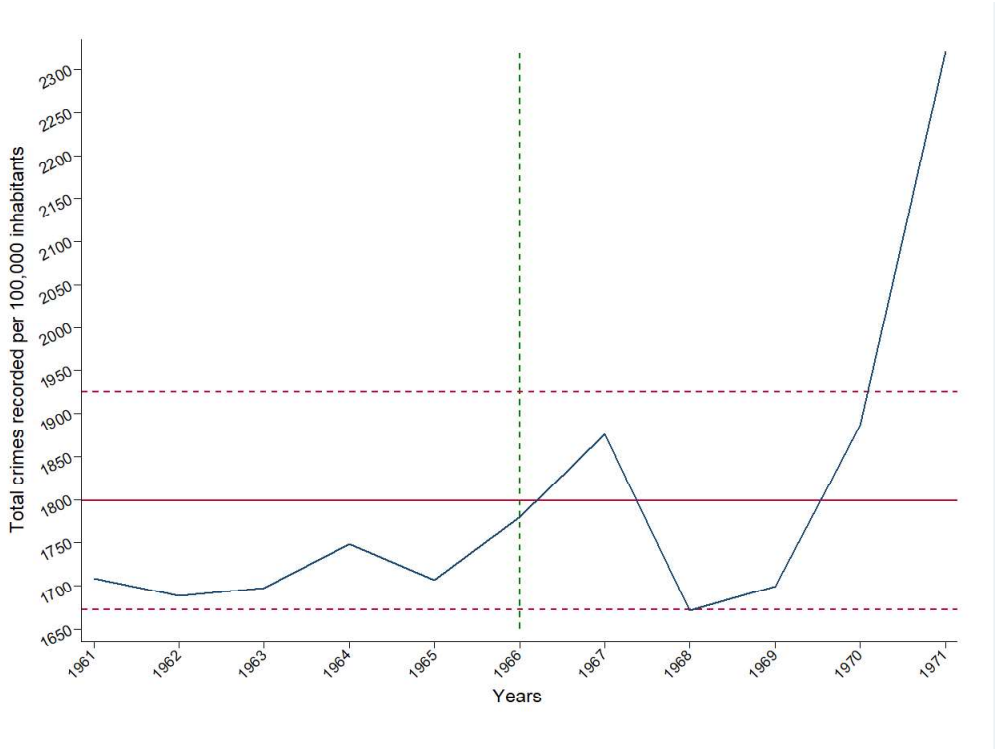


Figure 9: Total crimes in Italy, years 1961-1971.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

is not detected here. It is worth reminding that in 1966 the faithful had to travel to Rome and pass via the Holy Doors of the patriarchal basilicas, in order to obtain the Jubilee plenary indulgence. The short first notice about the beginning and the initially planned compactness of the event could cause fewer pilgrims to attend the celebration. This, in turn, might be the reason why the pattern observed around the Jubilee of 1966 is not similar to the previously observed double-top shape.

To summarize the first sub-sample five Jubilees impacts, in three out of five cases the total crimes recorded around the celebrations exhibited a similar behavioural pattern. At first, the crimes declined, likely as a result of the detachment from all sins required for obtaining the Jubilee indulgence, then stabilized for three years, as if promises not to sin again, given after the sacramental confession, were kept. Finally, a one-time compensation

peak occurred. In the case of Jubilee of 1933, a one-time pre-Jubilee increase in criminal activities can be clearly identified.

3.3. Italian crimes after 1971

The second sub-sample covers forty-two years, from 1972 to 2013. During this period, Italy did not participate in a global or a regional armed conflict, but rather fought internal wars. The crime levels trended upwards and displayed an increase in 1991. Figure 10 illustrates the dynamics of the criminal activities for the sub-sample and the three Holy Years celebrated: of 1975, 1983, and 2000. As previously, the Jubilees of the period are indicated by the green

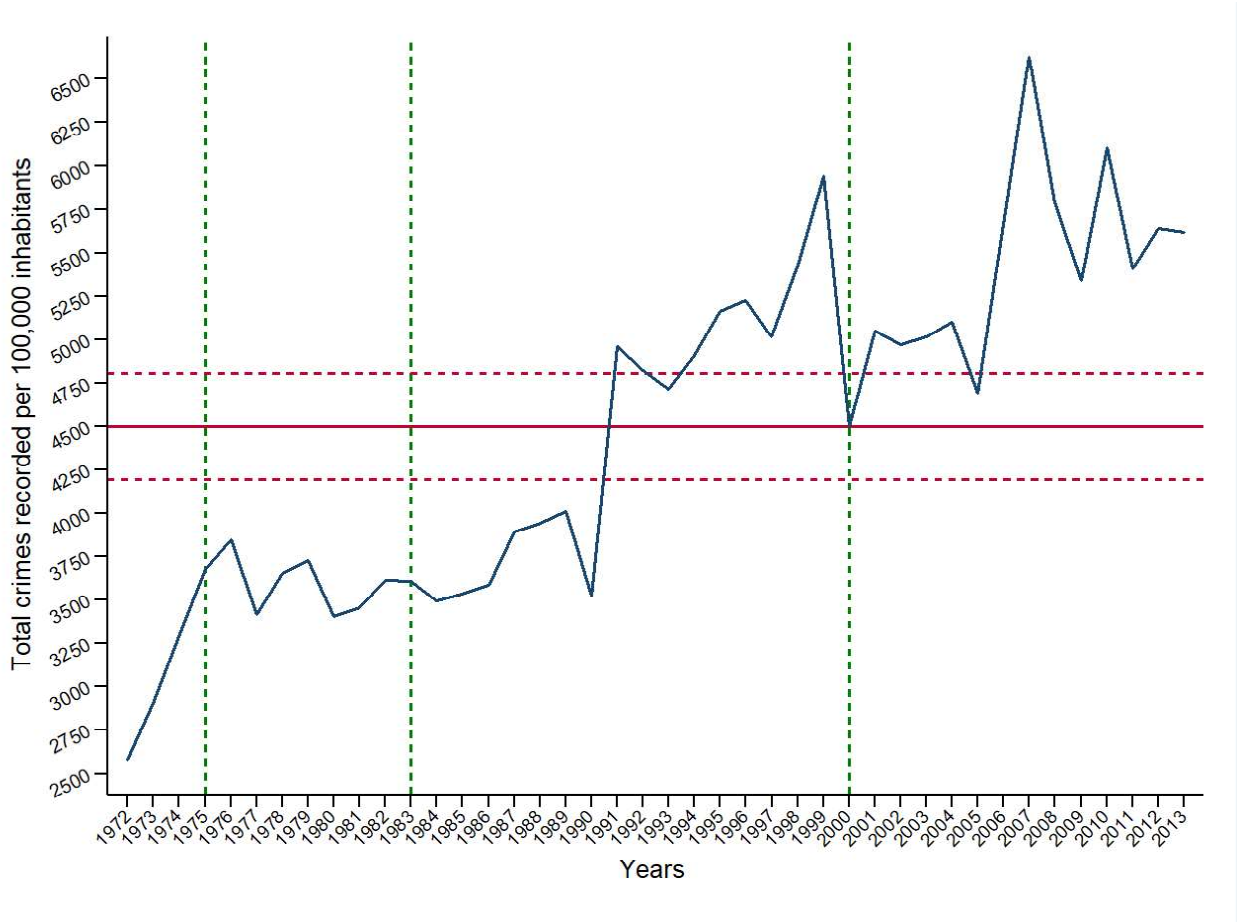


Figure 10: Total crimes in Italy, years 1972-2013.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

vertical dashed lines, while the crimes mean and the 95% confidence interval around the mean are marked by the horizontal red solid and dashed lines, respectively. At the beginning of the period, the "Years of Lead", which started in the late 1960s and continued until the early 1980s, caused a nationwide social unrest. Opposite radical political powers, supported from outside Italy, executed terrorist attacks on civilians, including the assassination of the Democratic leader Aldo Moro, in 1976, and the Bologna rail station massacre, that killed eighty-five people, in 1980. The next wave of criminality in the modern Italian history is associated with the rise of the Sicilian Mafia in the early 1990s, and the measures the Italian government tried to implement against the organized criminal organizations. The Mafia reacted, among other acts of resistance, by killing two judges in 1992 and an attack on a tourist attraction, resulting in ninety-three injured people and ten dead, in 1993. Last but not least, the beginning of the Great Recession in 2007, caused by the global financial crisis of 2007-2008, fuelled another sharp increase in the Italian criminal activities count.[41] All the events mentioned have created a few increases in crime levels, depicted in Figure 10. In terms of the sudden drops in criminal activities over the sub-sample period, the years of 2000 and 2008 could be noticed visually. As the data displayed an overall upward trend, de-trending would help to isolate the impacts of the various shocks on crime levels, including the influence of the Jubilees, if there are any, from the trend. Prior to de-trending, in order to check the stationarity of the data, a Dickey-Fuller (DF) test for unit root was performed. The DF test confirmed, at 5% significance level, that the time series is non-stationary and could be first-differenced to remove the stochastic trend. Alternatively, the presence of autocorrelation was examined. The serial correlation persistence was found to decline linearly, providing evidence in favour of the unit root hypothesis. The autocorrelation fades away relatively

[41]Regarding the increase in the crimes recorded in 2006, ISTAT explicitly noted: "Since 2006 provisional data. In 2006 a process of migration between different information systems began in some prosecutors, which is increasingly affecting all of these offices, resulting in a reflection on the data."

fast, after four lags.

The results of first-differencing of crimes for this sub-period are shown in Figure 11. At the first glance, the only Holy Year that had a strong negative impact on vices count is the Great Jubilee of 2000. In addition, a decline and some stability appeared around the Jubilee of 1983. A search for extreme values of changes in the differenced data confirmed that the Holy Year of 2000 was the foremost negative outlier for the sub-sample. Overall, four values of first differences in crimes were recognized as extreme values: two positive and two negative. These points are identified by the box-plot in Figure 12. The lowest negative value of 1,444 crimes less than the previous year corresponds to the year of 2000, while the next negative outlier of 840 crimes refers to the year of 2008. As of the positive outliers, the



Figure 11: First difference of crimes in Italy, years 1972-2013.

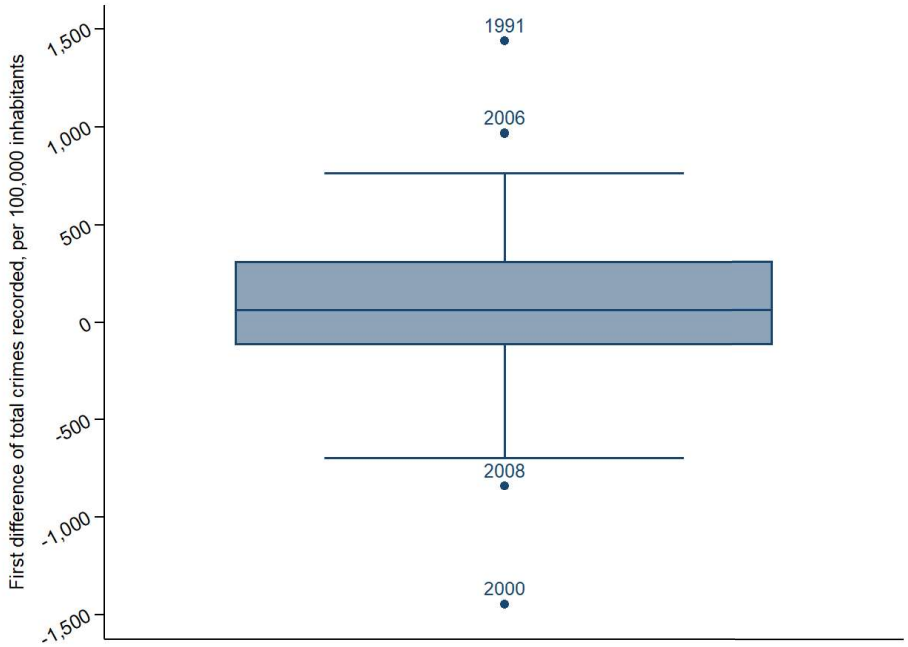


Figure 12: Boxplot of the first difference in Italian crimes, years 1972-2013.

smaller number, of 970 additional crimes, belongs to the year of 2006 of provisional data, while the increase of 1,440 crimes in 1991 verifies the violent impact of rise of Sicilian Mafia. To investigate the specific visible patterns around the Jubilees, if there are any, the next three paragraphs will focus on each Jubilee of the sub-period separately.

3.3.1. The Jubilee Year of 1975

The Jubilee Year of 1975 was celebrated toward the end of the turbulent "Years of Lead". Figure 13 plots the crimes and their first difference around the event.[42] No pattern, close to the double-top shape detected in the previous sub-sample, is observed. This fact could be explained by the absence of the event's impact or its' weakness, in comparison to the other powerful influences taking place around the same time.

[42]For Figures 13-15, the means and related confidence intervals are calculated over the amount of years stated in the captions of the figures. For this reason, the local means are not equal to zero.

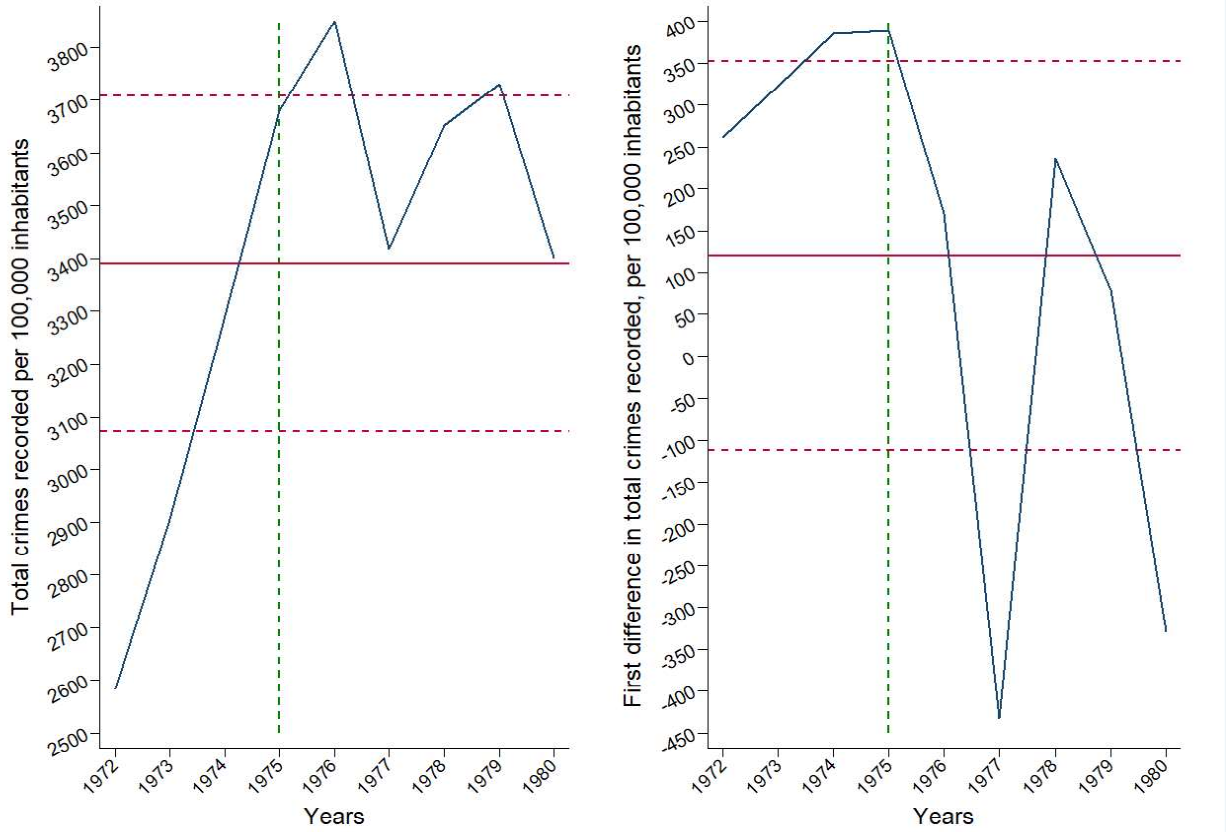


Figure 13: Total crimes and their first difference in Italy, years 1972-1980.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

3.3.2. The Jubilee Year of 1983

The Jubilee Year of 1983 was extraordinary in the sense that it was celebrated from March 25^{th}, 1983 to April 22^{nd}, 1984. In this case, the annually recorded criminal offences data does not align in full with the Jubilee event time-line. The crimes pattern around the event is depicted in Figure 14. The decline in crimes during the event spreads over two years, 1983 and 1984, instead of one, turning the left spike of the double-top pattern, observed in the first sub-sample of the data, into a shape with two vertices. This, in turn, shrinks the stability interval to last for only two years, instead of three, as in the first sub-sample

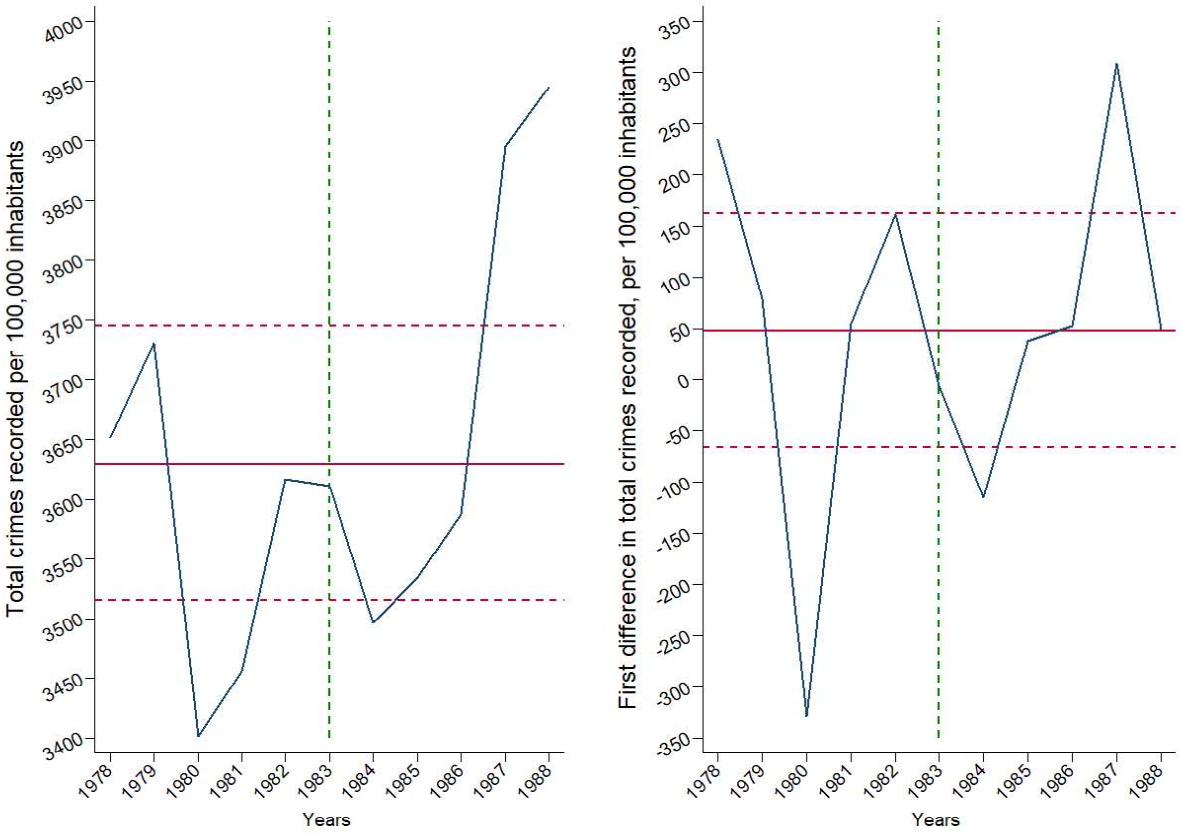


Figure 14: Total crimes and their first difference in Italy, years 1978-1988.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

patterns. The right panel of the first differences indicates this as well.

3.3.3. The Great Jubilee of 2000

The Great Jubilee of 2000 was executed as a celebration of a much larger scale than any other Jubilee event held over the history of the Catholic Church. Moreover, a significant simplification of rites allowed Catholics to obtain the Jubilee plenary indulgence without the mandatory pilgrimage to Rome. Consequently, one could expect the pattern and the extent of the event's impacts to differ substantially from all the Holy Years previously investigated. In the pattern observed around the year 2000, depicted in Figure 15, the crimes spiked

over the years 1998-1999, contrary to the Pope's call to the faithful to spiritually prepare themselves for the new millennium beginning. During the Great Jubilee itself, the one-time decline in criminal offences was substantial. However, the effect did not last and the number of crimes recorded corrected upwards partially right after the event's closure. Then some stabilization occurred. Quantitatively, the raw first difference in crimes recorded per 100,000 inhabitants from 1999 to 2000 was (1,444.61). In 2000, the Italian population was close to sixty million citizens. For sixty million inhabitants, a reduction in crimes of (1,441.61) per hundred thousand, from the preceding year of 1999, would accumulate to approximately

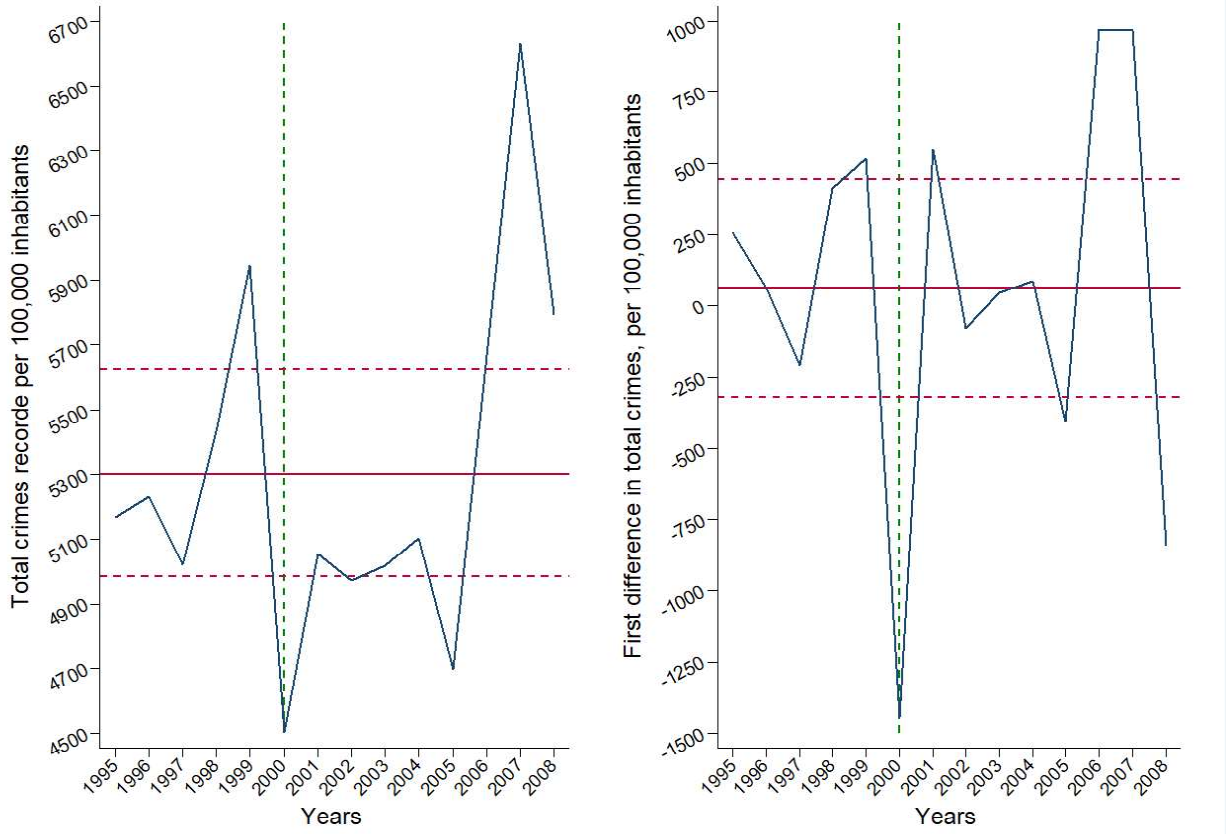


Figure 15: Total crimes and their first difference in Italy, years 1995-2008.
Source. ISTAT, "Time Series," accessed April 16, 2024, Crimes reported against known perpetrator for which the judicial authority began the criminal action and crimes reported against unknown perpetrator - Years 1888-2013 (per 100,000 inhabitants).

867,000 crimes less in total. As Rome experienced an additional influx of pilgrims-tourists, and thefts constituted around half of the total amount of crimes committed,[43] one could expect from the thieves not to miss the convenient opportunity to make a quick profit from tourists' pockets. However, this opportunity was missed. On the other hand, when taking into account the growth in crimes that occurred right before and after the Great Jubilee, then the negative effect of the event on crimes wanes.

To summarize the Italian crimes behaviour around eight Jubilees celebrated over the period of 1888-2013, at least in half of the cases the criminal offences dropped right before or during the event year, then remained constant for three years, then corrected upwards. In the case of the Great Jubilee of 2000, the level of recorded crimes first corrected, then stabilized.

4. European Studies

4.1. Data sets

4.1.1. EuroStat data on crimes

A second data set for the study on the impact of the Jubilee Year event on criminal activities is extracted from the European Commission Statistical Bureau (EuroStat) database. The sample of interest covers one full wave of the historical national administrative data on crimes collected annually from 1993 to 2007, fifteen years in total, with the Great Jubilee of 2000 event positioned right in the middle of the sampled period.[44] Out of the thirty-nine

[43] According to ISTAT, thefts accounted for 56.31% of the total crimes recorded in 2000.

[44] Only one Jubilee occurred for this period of time. A conceptually related worldwide event held during the year of 2000, known to the authors, was the "International Year for the Culture of Peace", declared by UNESCO and targeted all nations. This event launched media campaigns and collected around 75 million signatures in support of a culture of peace, under the Manifesto 2000 Project. In addition, a Culture of Peace News Network (CPNN) was established. For details, see UNESCO executive board session no.161 report (2001) on the event's results and Page's (2001) interpretation on its' efficacy. A separation of UNESCO event's influences on crimes recorded, if there are any, from the Jubilee impacts, will be addressed in the empirical analysis section.

countries presented, thirteen had missing observations and were excluded from the dataset in order to create a balanced longitudinal sample. The remaining 26 countries had 15 annual observations each. That is, the times series dimension of the sample in focus is 15 years, while the cross-sectional dimension is 26 units of observation (countries), making 390 observations in the panel data. All countries had stable geographical borders during the time period studied.

The annual offences data, as were recorded from January 1^{st} to December 31^{th} each year by law enforcement authorities, reflect all criminal law violations in each country. The main categories of crimes reported include intentional homicides, robberies, burglaries of private residential premises, thefts of a motorized land vehicle, unlawful acts involving controlled drugs or precursors and acts causing harm or intending to cause harm to the person, injurious acts of a sexual nature and acts against property involving violence or threat against a person.[45] All crimes assigned an equal weight in the sample. The data on crimes provided by EuroStat offers only the total amount of crimes recorded annually for each country, while the nations vary significantly by population size. Thus, creating a variable of crimes per hundred thousand inhabitants would help to adjust the overall amounts of crimes committed to the population size of each country, in order to make a valid comparison between the units of observation (countries) over time. For more consistency in sampling procedures, the population data for each country were extracted from the same source, the EuroStat database, and a variable of crimes per hundred thousand citizens was created, intended to serve as a dependent variable in the longitudinal data analysis.[46] A summary statistics for

[45]Notice that the main categories of crimes included by EuroStat differ substantially from the types of crimes emphasized by ISTAT in the Italian case discussed previously. If the impacts of the religious event in focus to be found consistent for both data sets, provided on distinctive crimes types and reported by independent statistical bureaus, this would enhance the validity of the findings, if there are any.

[46]For one of the countries in the sample, United Kingdom, the crimes provided by EuroStat are divided to England *and* Wales, Scotland and Northern Ireland, while the population data is supplied for the whole country only. For compatibility, the crimes were summed to total British crimes, each year, then a variable of crimes per 100,000 British citizens was calculated.

crimes recorded is presented in Table 2, across all countries and years. A full list of countries in the sample will be provided in the next sub-section, together with the statistics on religious affiliations.

Table 2: Summary statistics of crimes recorded across countries and years.

	Number of observations	Mean	S.d.	Minimum	Maximum
Crimes per 100,000 inhabitants	390	5,004.24	3,133.25	51.70	14,334.33

Notes. The unit of observation is crimes per 100,000 citizens in country i at year t. Number of observations refers to 26 countries observed over 15 years.

4.1.2. Data on European Catholicism

As the religious event studied, the Great Jubilee of 2000, is celebrated exclusively by the followers of the Roman Catholic Church, potential populations under the treatment of the event are the Catholics residing in each country sampled. Unfortunately, the exact number of indulgences granted to the faithful during the Jubilee Years, including the Great Jubilee of 2000, is unknown. The Holy See, or any other source, never published a statistical research on the count of the indulgences obtained, to the best of my knowledge. One of the reasons for lack of this data could be the private and sacramental nature of the confession required for obtaining an indulgence. If this conjecture is correct, individual-level data on such a delicate spiritual matter will never be available for research purposes. However, the Catholic share of the populations can serve as a proxy for the amount of indulgences granted, especially in the case of countries where Catholics constitute the vast majority of the population and could potentially cause a substantial divergence in criminal activities count, if impacted by the Jubilee Year customs. To give a clear picture on the presence of the Catholic faith in Europe, Figure 16 maps all European countries by their Catholic share. The dark red color indicates countries where majority of the population identifies as Catholics, while a yellow shade points out non-Catholic religious and/or secular dominances. As shown in the graph,

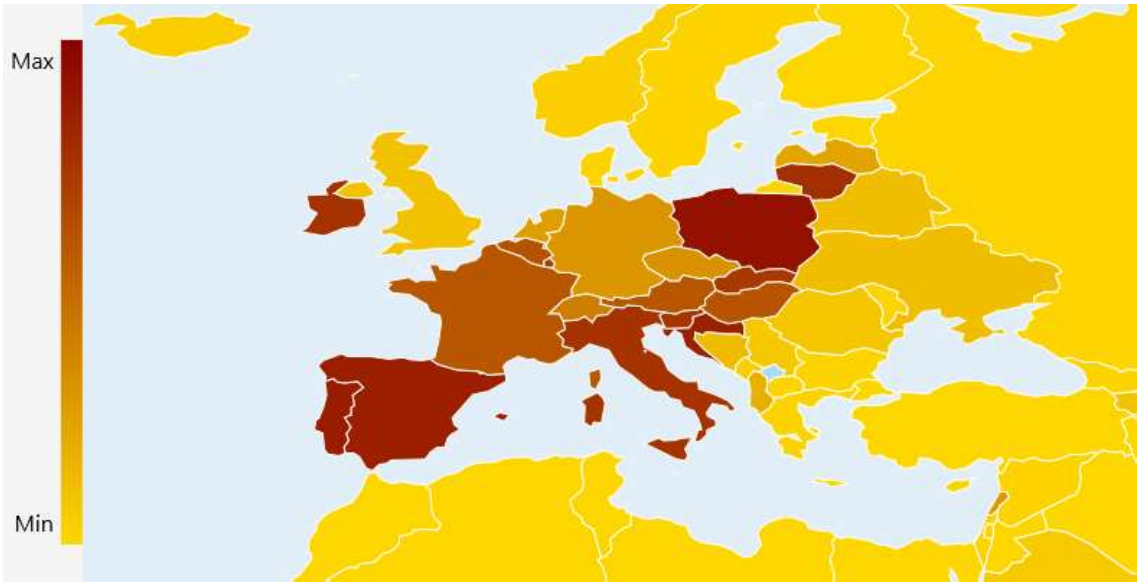


Figure 16: The percentage of Roman Catholics in the population of European countries as of 2020.
Note. A little blue dot in the middle is a "no data" region in Kosovo.
Source. Association of Religion Data Archives (ARDA), "World Maps of Religion Affiliation," accessed April 17, 2024, Adherents: Catholics.

the Catholic faith is a very prominent religious denomination in many European countries.

As of countries from the longitudinal balanced sample in focus, their populations and Roman Catholic shares in 2000 are presented in Table 3, in a descending order. The percentage of Roman Catholics contains Catholics of Latin and Non-Latin Rites, both under the spiritual authority of the Holy See. The Non-Latin Rites denominations comprise combined Armenian, Coptic, Ethiopian, Mar Thoma and Syrian (including Alexandrian and Antiochian) Catholic Rites. However, the Non-Latin Rites Catholics constitute a historically minuscule fraction of Roman Catholics in Europe. As shown by the table, in twelve countries out of twenty-six, Catholics dominate other religious confessions by the simple majority, while in ten countries out of twenty-six the Catholic faith followers exceed seventy percent of the population. Given the fact that the Great Jubilee of 2000 was the first planetary Jubilee and every Roman Catholic could take part in the event without travelling to Rome, such elevated Catholic shares should be sufficient to detect the influence of the celebration on

Table 3: Total population and Roman Catholics by percentage in twenty-six selected European countries, in 2000.

Country	Total population, millions	Roman Catholic share of the population
Poland	38.35	90%
Croatia	4.48	86.84%
Portugal	10.31	84.53%
Slovenia	1.99	80.08%
Lithuania	3.5	79.12%
Italy	56.99	78.87%
Spain	40.28	74.93%
Austria	8.02	74.25%
Luxembourg	0.44	72.62%
Slovakia	5.39	72.1%
France	59.21	60.97%
Hungary	10.22	55.98%
Switzerland	7.17	42.3%
Germany	83.51	32.57%
Netherlands	15.86	32.2%
Czechia	10.25	28.09%
United Kingdom	58.95	9.6%
Romania	22.39	5.7%
Cyprus	0.94	1.56%
Sweden	8.87	1.38%
Norway	4.49	0.9%
Denmark	5.34	0.64%
Estonia	1.37	0.51%
Greece	10.99	0.5%
Finland	5.18	0.14%
Turkey	66.9	0.05%

Source. Association of Religion Data Archives (ARDA), "Religious Characteristics of States Dataset," accessed April 16, 2024, Religious Characteristics of States Dataset Project - Demographics v. 2.0 (RCS-Dem 2.0), COUNTRIES ONLY

crime levels in predominantly Catholic countries, if there is any.

In the empirical analysis to follow, dichotomizing the countries in the sample by Catholic majority/non-majority (or super-majority of 70%) in 2000 can serve as an identification tool for countries under treatment of the event. Furthermore, the super-majority sub-sample, as containing countries with higher share of Catholics in the populations, should potentially be impacted more by the Jubilee celebration than the simple majority larger set of nations, on average, if there is such impact to be detected. The frequencies of the Catholic majority/super-majority over the sampled period are provided by Table 4.

With regards to the Catholic majority/super-majority frequencies, it is worth noting that in some countries the Catholic shares developed slowly over time, crossing the thresholds (of 50% or 70%) from above or below only once over the time period in focus. For this reason, the same country could be counted as having a Catholic majority in one year, but not having

Table 4: Catholic majority/super-majority frequency across countries and years.

Panel A: Majority	Frequency	Percent
0	213	54.62
1	177	45.38
Number of observations	390	100
Panel B: Super-majority	**Frequency**	**Percent**
0	250	64.10
1	140	35.90
Number of observations	390	100

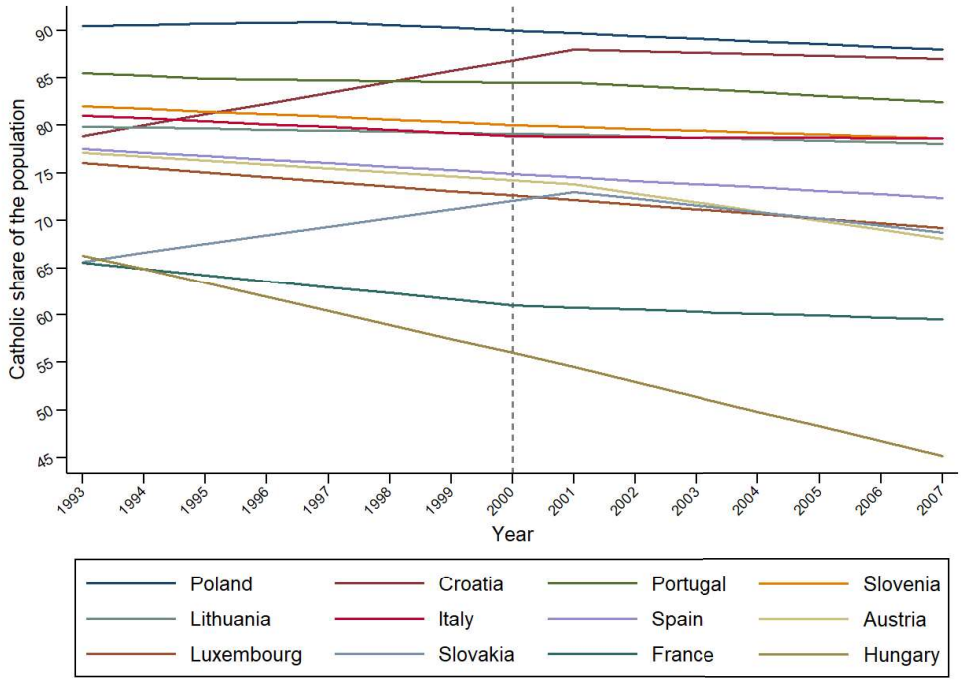
Notes. Majority definition stands for 50%+1 of Catholics in the population. Super-majority is determined when when Catholics constitute at least 70% in the population. Number of observations refers to 26 countries observed over 15 years.
Source. Association of Religion Data Archives (ARDA), "Religious Characteristics of States Dataset," accessed April 16, 2024, Religious Characteristics of States Dataset Project - Demographics v. 2.0 (RCS-Dem 2.0), COUNTRIES ONLY, years 1993-2007.

it in another year, or vice versa. Furthermore, in one country, Slovakia, such threshold (of 70%) was crossed more than once, as the Catholic shares developed over time in a non-linear fashion. In Slovakia, the percentage of Catholics in the population was increasing from the beginning of the period and crossed the threshold of 70% from below in 1998, remained above the threshold until 2006, then declined beneath 70% level again.

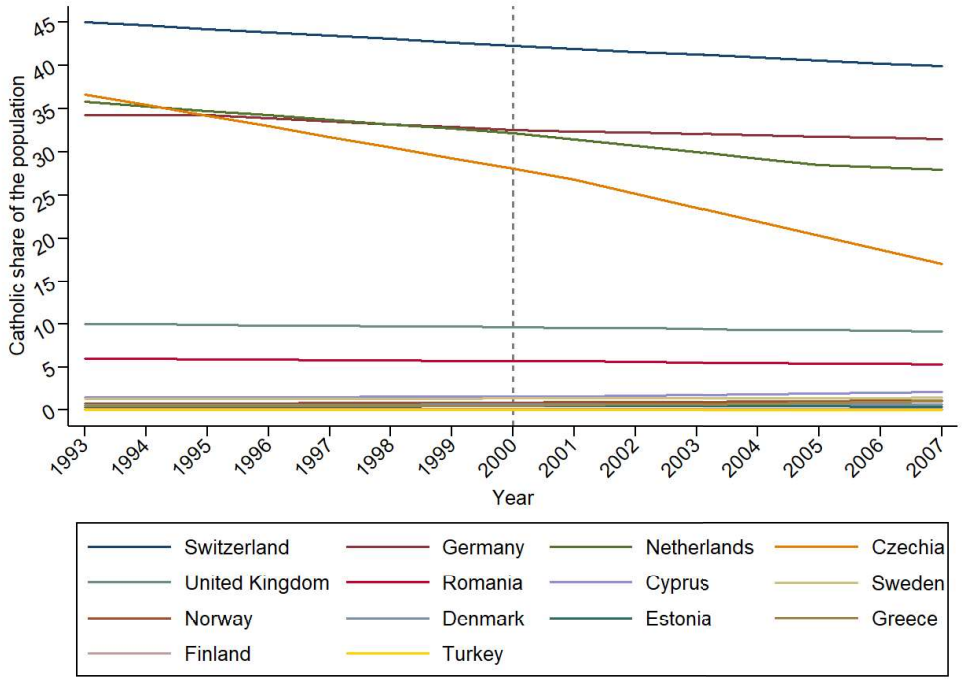
The development of the Catholic shares in each country over time is illustrated in Figure 17, where upper panel concentrates on countries with Catholic shares higher than fifty percent, and lower panel on the rest of the countries.

In Figure 17(a), a very weak decrease is observed for all except two countries, Slovakia and Luxembourg. These two countries have an increase with a kink in 2001. Hungary exhibits a steeper than other countries decline. In Figure 17(b), the percentage of Catholics in the population remains constant in all countries but Netherlands, Czechia and Switzerland, which show a linear decrease. In addition, kinks detected for Czechia in 2001 and Netherlands in 2005. As shown by the figures, no inflow/outflow of faithful is observed around the year of 2000, i.e. the occurrence of the Great Jubilee event did not cause a massive enrolment into Catholicism in order to obtain the remission of sins, nor retraction of believers from Catholicism after the event was over.

Polled Catholic shares summary statistics, for all countries in the sample, is provided by Table 5. Despite the wide spread in the Catholic shares count between the countries, documented by Tables 3 and 5, Figure 17 showed that the percentage of Catholics in the populations changed gradually over time, in the vast majority of countries.



(a) Catholics as a percentage of the population in Catholic majority countries.



(b) Catholics as a percentage of the population in Catholic minority countries.

Figure 17: Catholics as a percentage of the population in European countries.
Source. Association of Religion Data Archives (ARDA), "Religious Characteristics of States Dataset," accessed April 16, 2024, Religious Characteristics of States Dataset Project - Demographics v. 2.0 (RCS-Dem 2.0), COUNTRIES ONLY, years 1993-2007.

Table 5: Catholic shares summary statistics across countries and years.

	Number of observations	Mean	S.d.	Minimum	Maximum
Catholic share	390	40.84	34.57	0.05	90.88

Notes. The unit of observation is a percentage of Catholics in country i at year t. Number of observations refers to 26 countries observed over 15 years. The maximal percentage of Catholics, 90.88%, belongs to Poland, while a minuscule fraction of 0.05% indicates the percentage of Catholics residing in Turkey.
Source. Association of Religion Data Archives (ARDA), "Religious Characteristics of States Dataset," accessed April 16, 2024, Religious Characteristics of States Dataset Project - Demographics v. 2.0 (RCS-Dem 2.0), COUNTRIES ONLY, years 1993-2007.

4.1.3. Data on additional macro-economic variables

While the event in focus, the Great Jubilee of 2000, is of religious nature, considering additional explanatory macroeconomic variables in the empirical analysis could enrich the model and help to verify that the results obtained on the impact of the event are robust to alternative specifications. I consider two variables that could potentially impact crime levels: urban population share and inflation rate. An urban population share is a macroeconomic measure related to the population density family of indicators. Specifically, an urban share of the population points out the degree of population concentration in the cities (or urban areas) and should, potentially, be positively correlated with the amount of crimes recorded. Summary statistics for urban population shares, collected by the United Nation Population Division and provided by the World Bank Development Indicators database, is shown in Table 6. Similarly to the Catholic shares, urban shares of the population developed slowly over time in each country. Another socio-economic factor appropriate to incorporate as explanatory variable in the analysis is an inflation rate. This is because the decline in purchasing power of the local currency could reduce the level of the real disposable income for many households. For this study, the dataset on Consumer Price Index (CPI) were collected by the International Monetary Fund and provided by the World Bank Development Indicators.

Table 6: Urban population shares summary statistics across countries and years.

	Number of observations	Mean	S.d.	Minimum	Maximum
Urban population share	390	69.55	10.25	49.79	87.41
Inflation rate	390	13.90	81.22	-1.13	1500

Notes. The unit of observation is a country i at year t. Number of observations refers to 26 countries observed over 15 years.
Source. World Bank, "World Development Indicators," Washington, D.C.: The World Bank, 2024, accessed April 16, 2024, World Development Indicators, years 1993-2007.

Inflation rates for the sampled period are also presented in Table 6. As shown in the table, inflation rates varied significantly. In particular, two-digits or even three-digits annual inflation was observed for the countries with a Socialist past at the beginning of the period.[47] One plausible explanation is that after Communism was replaced, a stabilization of Post-Socialism economies took a few years. This transition is reflected in the data by declining inflation rates from the year 1993 onward.

In terms of the social justice systems, the countries with a Socialist past inherited a fundamentally different law making and law enforcement infrastructures, which had to rapidly adjust to the standards of Western democracies after the regimes switched, as all ex-Communist countries in the sample applied to join the European Union. Countries-applicants had to fully comply with *Copenhagen criteria*, which include chapters on judiciary and fundamental rights, justice, freedom *and* security, company law, intellectual property law, and more. To account for such distinctive in criminal coding/recording past in the empirical analysis, ex-Communist countries in the sample were marked by an ex-Communism binary variable. These countries include: Poland, Croatia, Slovenia, Slovakia, Lithuania, Hungary, Czech

[47]The highest annual inflation rate in the sample of 1500% a year belongs to Croatia in 1993.

Republic, Romania and Estonia.[48,49]

4.2. Empirical strategies and analysis

4.2.1. The model

Let us now consider the balanced panel data on 26 European countries where the annual crimes rates were recorded over 15 years, discussed in sub-section 4.1. Let the unit of observation (country) be denoted by i, $i = 1 \dots N$, where $N = 26$ and the year by t, $t = 1 \dots T$, where $T = 15$. The total count of observations is the amount of countries times the number of years, or $N \cdot T = 26 \cdot 15 = 390$. In the model, binary explanatory variables to be denoted by D and the rest of the control variables by x. Each variable to be indexed by i and t. The impact of the event on crimes to be estimated by the model of the form:

$$crimes_{i,t} = \beta_0 + \beta_1 D^1_{i,t} \cdot D^2_t + \beta_2 x^1_{i,t-1} + \beta_3 x^2_{i,t-1} + \beta_4 x^3_{i,t-1} + \beta_5 D^3_i + \mu_t + \varepsilon_{i,t} \qquad (1)$$

where the dependent variable $crimes_{i,t}$ is the level of crimes recorded per 100,000 citizens in country i at year t. The crime rates are explained by the following independent variables.

A variable $D^1_{i,t}$ is a Catholic super-majority binary variable that takes upon a value of one if the percentage of Catholics in country i at year t exceeds the threshold of 70% of the population. Alternatively, if the percentage of Catholics falls below 70%, a value of zero is assigned to $D^1_{i,t}$.

A variable D^2_t is a binary variable that identifies the presence of the religious event shock. As such, it is assigned a value of one when the year is 2000, and zero otherwise. That is, $D^2_{year=2000} = 1$ and $D^2_{year \neq 2000} = 0$.

The interaction term, $D^1_{i,t} \cdot D^2_t$, is placed to isolate the impacts of the event on predominantly

[48]Germany was not coded as ex-Communist, as West Germany exceeded East Germany by territory and population sizes.

[49]Poland and Romania joined the European Union in 2007, and the rest of the countries in 2004. The application process to obtain a candidate status and later on a full membership took years.

Catholic countries, as it takes a value of one only when a country i has at least 70% of Catholics in the population at year t *and* the year is 2000.[50]

All the controls to be used in the analysis, indicated by x, are extracted for the year prior the annum crimes levels were recorded, effectively making all the independent variables denoted by $x_{i,t-1}$ predetermined/exogenous to $crimes_{i,t}$. This, in turn, eliminates potential endogeneity and/or reverse causality issues between the crimes levels recorded at t and the vectors of explanatory variables. In other words, an explanatory variable measured at year $t-1$ could impact the crimes levels at year t, but not the opposite direction.

A variable $x^1_{i,t-1}$ denotes the percentage of Catholics in country i at year $t-1$. The reason for adding an independent variable of the exact share of Catholics in the population alongside with the Catholic super-majority binary variable is to create a separation of Catholicism related influences on crimes levels, at all times, from the impacts of the one-time event, if there are any. The Catholic shares of the populations are considered at $t-1$, as in most of the countries the percentage of Catholics changed over time at a slow rate, as was shown by Figure 17.[51,52]

A variable $x^2_{i,t-1}$ is the urban population share in country i at year $t-1$. This variable represents the percentage of the population concentrated in the cities. Such concentration, when increasing, is expected to be positively correlated with the amount of crimes recorded. When the urban population share is taken into account at $t-1$, potential reverse causality issues, arising from, for instance, higher crimes levels that could potentially cause urban

[50]The countries under the treatment are the first 10 countries enumerated in Table 3, with percentage of Catholics higher than 70% of the population in 2000. Same countries maintained the Catholic super-majority ranking in 1999, leading to $D^1_{i,2000} \cdot D^2_{2000} = 1 \Leftrightarrow D^1_{i,1999} \cdot D^2_{2000} = 1$. Moreover, if a softer definition of super-majority to be applied, e.g. 66.67% of the country population identify themselves as Catholics instead of 70%, the list of countries under the treatment would remain unchanged.

[51]Kinks, observed for Slovakia, Luxembourg, Czechia and Netherlands, do not exceed 2% change in Catholic shares, in absolute value.

[52]Replacing the shares at $t-1$ with the contemporary ones would not change the results of the analysis qualitatively.

residents to move out from the cities during the same year, are avoided.

A variable $x^3_{i,t-1}$ is the difference in inflation rates, calculated between the years $t-1$ and $t-2$. The logic behind using as a control variable the change in CPI and not the raw inflation rate itself, is that the change in CPI could reflect better on how the fluctuations, especially sharp, in CPI would impact crimes levels. For example, the relatively low and persistent inflation, observed recently in many European countries for long periods of time, adjusted the public expectations to continue to experience similar levels of inflation in the future, especially when the Central Banks openly confirmed their inflation targets. When such expectations are not realized, and the inflation rose (dropped) more than expected, crimes, especially property crimes, could increase (decrease).

The binary variable D^3_i is a Post-Communism indication variable. When takes upon a value of one, it separates a Soviet era historical heritage European countries might carry, in terms of criminal behaviours, from the rest of the countries.

The variable μ_t indicates time fixed effects, while $\varepsilon_{i,t}$ is the error, with mean zero and assumed to display cluster heterogeneity at the year level.

4.2.2. Empirical results

In order to assess the impacts of the religious event in focus on crimes levels, model (1) from previous sub-section was empirically estimated. The estimation results are reported in Table 7, where in each column of the table additional explanatory variable is added.

Column (1) examines the basic case where only Catholicism related independent variables are incorporated in the analysis. The purpose of examining Catholic shares together with the Jubilee impacts in predominantly Catholics countries is to separate the influences of the criminal behaviour patterns of all Catholics, at all times, approximated by the religious shares of the populations, from the Jubilee celebration related shift in criminal activities count, if there is any. By column (1) estimation results, Catholics committed less crimes

than other religious/secular denominations, on average, over the time period sampled and especially during the Great Jubilee of 2000 event's celebration in predominantly Catholic countries. The latter finding is of particular interest, as the event's impact on crimes levels in Catholic super-majority countries found to be negative and significant at 1% level.

However, the former finding is challenged when additional controls are incorporated, as the Catholic shares estimated coefficient switched sign from negative in column (1) to positive in column (2), after the urban population share was added.[53] As expected, an urban population share at $t-1$ found significant and positively correlated with the levels of crimes recorded, likely due to the fact that crowded environments, such as cities, offer more opportunities for criminal activities to take place. The estimated coefficient of the Great Jubilee of 2000 impacts declined by more than half in absolute value, from column (1) to column (2), but remained negative and significant at 1% level.

In column (3), raising inflation at $t-1$ estimated to have a positive correlation with crimes recorded at t, at 5% significance level, while the rest of the coefficients maintained the magnitudes and significance levels similar to column (2) estimation results. It is worth noting that years of very high inflation, and drastic changes in inflation rates, were observed in a few post-Soviet countries at the beginning of the sampled period. In consistency with this observation, incorporating a binary variable of Post-Communism, in column (4), weakened the magnitude and the significance level of the change in inflation rate estimated coefficient. Moreover, the ex-Soviet countries were assessed to have substantially lower crimes recorded levels than other countries in the sample. One plausible conjecture of the social nature underlying this finding can be that under stricter, less democratic regimes a fear of severe

[53]One explanation to this fact could be that detailed definitions of an abundance of sins, shaped and polished by the Catholic Church doctrine over centuries, became with time integral parts of civil criminal codes in predominantly Catholic countries. More bad deeds defined as criminal, in turn, caused the overall count of crimes to level up, in a distinctive way in different Catholic countries. Nonetheless, this explanation requires further examination and out of scope of this paper.

Table 7: Fixed effects estimates of crimes: the Jubilee Year event effect.

Dependent variable: crimes per 100,000 inhabitants	(1)	(2)	(3)	(4)
$Catholic\ supermajority_{i,t} \cdot Jubilee_{2000}$	-6.48***	-2.59***	-2.49***	-3.00***
	(0.43)	(0.69)	(0.73)	(0.70)
$Catholic\ share_{t-1}$	-0.25***	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
$Urban\ population\ share_{t-1}$		2.25***	2.25***	2.00***
		(0.06)	(0.06)	(0.07)
$Change\ in\ inflation\ rates_{t-1}$			1.01**	0.08*
			(0.37)	(0.42)
$PostCommunism_i$				-9.83***
				(0.01)
Year FE	Y	Y	Y	Y
R^2	0.08	0.50	0.50	0.52
$R^2 - adjusted$	0.04	0.05	0.05	0.50
σ_u^2	152.68	124.26	168.44	142.74
σ_e^2	3,064	2,265	2,260	2,230
ρ	0.002	0.003	0.006	0.004
AIC	7,353	7,118	7,026	7,017

Notes. The unit of observation is crimes per 100,000 citizens in country i at year t. All columns include a constant. Standard errors, reported in parentheses, adjusted for cluster heteroscedasticity at the year level. Asterisks ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively. R^2-adjusted is extracted using equivalent *areg* command. σ_u^2 is the variance of the annual fixed effects, while σ_e^2 is the variance of the idiosyncratic error. ρ indicates the fraction of variance due to fixed effects. Post-estimation Akaike Information Criterion (AIC) calculated for each column. All the coefficients reported and the standard errors related, except inflation rates change, are divided by 100, as shares in the data were given as numbers and not percentages. Super-majority stands for higher than 70% share of Catholics in the population. $n = 390$ in columns (1) and (2) and $n = 385$ in columns (3) and (4) due to a few missing observations for inflation rates in post-Communism countries. For column (4) full specification of model (1), within variation accounts for 0.52, while between variation equals 0.29.
RESULTS: The impact of the Great Jubilee of 2000 event on crimes levels in predominantly Catholic countries is negative and significant.

prosecution kept the crimes recorded at moderate level. Years after the Soviet regimes were supplanted by democratic ones, and all the Post-Communism countries in the sample joined the European Union, this fear could still persist in the parts of the populations mature enough to remember the past law enforcement methods. The magnitude and significance of the estimated coefficient on ex-Communism binary variable, together with the explanatory power it contributed to the model, is the evidence of the importance of the Soviet heritage influence on crimes levels measured relatively recently. If such comparison is appropriate, and for this study only, being an ex-Communist country is estimated to suppress crimes levels three times more than a major religious event of remission of sins, as the coefficient on ex-Communism exceeded minus 9, while the Jubilee of 2000 impact coefficient reached minus 3 only, in 2000. In terms of the countries involved, the list of the ex-Soviet countries does not align with Catholic super-majority representatives, as only five out of ten mostly Catholic nations had a Communist past.[54]

In all columns of Table 7, including column (4), crimes recorded per 100,000 inhabitants, in predominantly Catholic countries, estimated to be negatively impacted by the occurrence of the Great Jubilee of 2000 event and the related custom of indulgences. To quantify this finding, it is of help to calculate by how much, in total, the crimes in the Catholic super-majority countries were predicted to decline in 2000. Summarizing the populations of the treatment group countries,[55] 169.75 million of people were potentially impacted by the event in focus. As the average impact of the Great Jubilee of 2000 in these countries was estimated to equal close to minus 3 per 100,000 citizens, in column (4), for an overall population of 169.75 million in predominantly Catholic countries this would accumulate to

[54]Poland, Croatia, Slovenia, Lithuania and Slovakia. The non-Catholic ex-Soviet countries are: Czech Republic, Romania and Estonia. Hungary was a simple-majority Catholic country in 2000, and treated here as a control group unit of observation.

[55]First ten countries listed in Table 3.

a total reduction of 509,250 crimes in 2000.[56]

The residuals from the full model (1) specification regression, listed in Table 7, column (4), when plotted, exhibited stationarity over time. Fixed effects annual coefficients, complementary to Table 7, column (4), estimation results, are enumerated in Table 8. All the coefficients reported are relative to the baseline year of 1993, a first year of the sampled period. Out of annual impacts estimated, of particular importance is the coefficient on the year of 2000. In general, the estimated coefficient on the beginning of the new millennium year could potentially accumulate any influences on all religious/secular denominations criminal behaviours shifts, e.g. if people believed that the world is about to end in 2000 and decided to commit more (or less) crimes.[57] While all the annual effects reported in Table 8 are negative, the coefficient on the year 2000 is between the three lowest in absolute value and closest to zero. In other words, the annual estimated impact of the year 2000 on crimes recorded levels in all countries in the sample, on average, is one of the least negative, relatively to the baseline year of 1993. To illustrate this graphically, Figure 18 plots the annual fixed effects estimated coefficients from Table 8. As evident from the plot, the annual estimated coefficient on year 2000 is higher than of surrounding years. In addition, the second widest, after 1995 confidence interval indicates higher uncertainty in 2000 for all countries in the sample.

To summarize the main results for the panel data analysis of model (1), presented by Tables 7 and 8, an estimation of the Great Jubilee of 2000 impacts on the Catholic supermajority countries criminal activities levels showed that the crimes recorded per 100,000 citizens in 2000 declined in treated by the Great Jubilee event countries, where the vast majority of the population followed the Roman Catholic Church doctrine and the Jubilee related custom of obtaining a remission of sins.

[56]Recall that the estimated coefficients in Table 7 were divided by 100 out of convenience.
[57]During the year of 2000 a UNESCO peaceful initiation, targeting all nations, took place.

Table 8: Fixed effects estimates of crimes: Annual coefficients.

Dependent variable: crimes per 100,000 inhabitants		
Year	1994	-3.09***
		(0.09)
	1995	-3.14***
		(0.41)
	1996	-4.23***
		(0.16)
	1997	-4.21***
		(0.01)
	1998	-2.85***
		(0.01)
	1999	-2.93***
		(0.01)
	2000	-1.95***
		(0.04)
	2001	-2.88***
		(0.01)
	2002	-1.49***
		(0.02)
	2003	-1.40***
		(0.02)
	2004	-2.29***
		(0.02)
	2005	-3.95***
		(0.02)
	2006	-4.86***
		(0.02)
	2007	-5.38***
		(0.02)

Notes. Annual fixed effects complementary to Table 9, column (4), estimation results. The unit of observation is crimes per 100,000 citizens in country i at year t. Standard errors, reported in parentheses, adjusted for cluster heteroscedasticity at the year level. Asterisks ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively. 1993 is omitted as a default baseline year in Stata. All the coefficients reported, and the standard errors related, are divided by 100.

Before proceeding with the formal analysis of the model's alternative specification, it is worth noting that alternative controls of GDP per capita and the unemployment rate at $t-1$ were

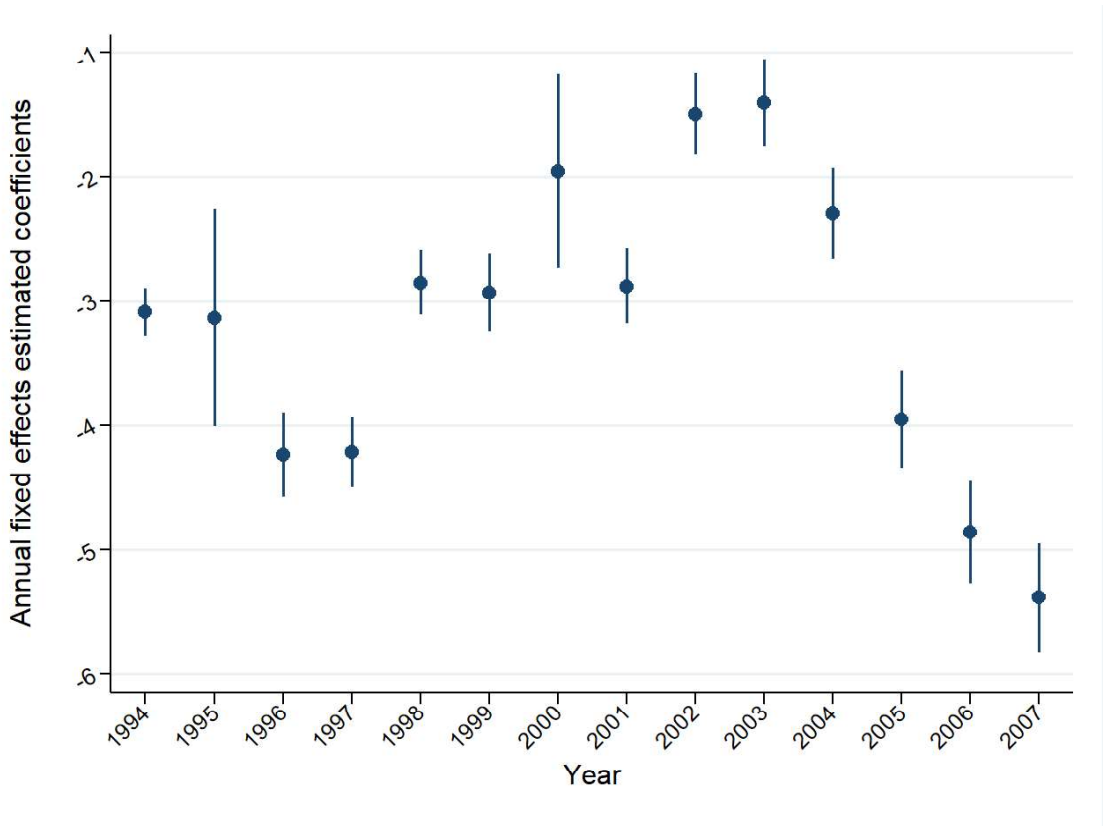


Figure 18: Annual fixed effects coefficients, Table 8.
Notes. Vertical lines indicate the 95 percent confidence intervals. All the coefficients are relative to the baseline year of 1993.

considered, but they did not add much explanatory power to the model, nor did they provide significant results or change the main findings regarding the impacts of the Great Jubilee of 2000. When estimated, the first lag of the unemployment rate was found to be marginally (at the 10% level) positively significant in explaining crime levels. This indicates that the economic impacts of the Jubilee Year of 2000 celebration could not influence crime reduction estimations, especially since the centralized event was held only in Rome, thereby geographically limiting its influence. In other words, any economic boost created by the mega-event in Italy, if it existed, could not reduce crime levels in nine other Catholic countries across Europe. The same argument applies to the increased presence of law enforcement in Rome during the event, which could potentially reduce crime, but only in Rome.

4.2.3. Alternative specification

In order to strengthen the validity of the main result on the Great Jubilee of 2000 impacts obtained in the previous sub-section, an alternative treatment group of countries to be proposed as a replacement to the Catholic super-majority set of countries, i.e. an extended list of Catholic simple-majority nations, following model (1). Expanding the Catholic treatment group of countries to include simple majority candidates would show how the estimated coefficient on the Great Jubilee of 2000 event impacts could change under declining average percentage of Catholics in the target populations. On the other hand, half of the population identified as Catholic, in each country, is still a fraction substantial enough to detect the impacts of the event on crimes levels, if there are any. Thus, two more countries with the next high Catholic shares in the population to be added into the original treatment list of countries, effectively extending the treatment group to include twelve countries instead of ten and shrinking the control group by two units of observation. These countries are France and Hungary, which had a fraction of Catholics in the population higher than 50%+1, but lower than 70%, in 2000.[58] For empirical estimation, model (1) was modified accordingly, by replacing the super-majority variable, $D^1_{i,t}$, with the simple majority indicator, $D^4_{i,t}$, *ceteris paribus*, leading to the following model:

$$crimes_{i,t} = \beta_0 + \beta_1 D^4_{i,t} \cdot D^2_t + \beta_2 x^1_{i,t-1} + \beta_3 x^2_{i,t-1} + \beta_4 x^3_{i,t-1} + \beta_5 D^3_i + \mu_t + \varepsilon_{i,t} \qquad (2)$$

The results from estimating model (2) are presented in the Appendix A, Tables A.1 and A.2, in a fashion similar to Tables 7 and 8 for model (1). That is, Table A.1 focuses on main explanatory variables estimated coefficients, while Table A.2 complements for the annual fixed effects results.[59]

[58] See Table 3 for details.

[59] For Table A.1, column (4) full specification of model (2).

As shown by Table A.1, all the estimated coefficients, with the exception of the Great Jubilee of 2000 impacts, are very similar, by magnitude, sign and significance, to the results obtained previously in Table 7. Same is true for Table A.2, that represents annual fixed effects coefficients for Table A.1, column (4) and shows results very close to Table 8 estimated coefficients. However, the main coefficient of interest on the impacts of the Great Jubilee of 2000 religious event on Catholic countries crimes levels differs substantially from Table 7 to Table A.1 estimation results. More precisely, the estimated impact of the Jubilee event on Catholic countries crimes levels declined in all columns of Table A.1 in comparison to the parallel columns of Table 7. In particular, comparing results in columns (4) of both tables, the estimated coefficient on the Jubilee event decreased, in absolute value, from negative 3 (in Table 7) to negative 2.26 (in Table A.1). In all modelled specifications in both tables, the estimated impact of the event in focus maintained significance at 1% level.

When model (1) was replaced by model (2), the total population in the enlarged group of twelve potentially treated countries grew by 69.43 million people, a difference referred to France and Hungary inhabitants count combined. For the Catholic simple-majority treatment group of 239.18 million citizens, total crimes recorded were estimated to decline by close to 540,547 crimes, in 2000. Quantitatively, diluting the average percentage of Catholics in the treatment group countries by adding 69.43 million people, or 40.9%, from "less Catholic" countries, increased the total estimated crimes reduction by 31,297 crimes, or 6.1% only, while in the initial ten super-majority group of countries the average percentage of Catholics was 80.04%, versus 74.55% in the extended simple-majority group of twelve countries.

With regards to the main finding obtained on the impact of the Great Jubilee of 2000 on crimes recorded behaviour in predominantly Catholic countries, an alternative specification performed in this sub-section did not undermine the empirical validity of the discovery that the religious event in focus had a negative and significant impact on crimes levels. Furthermore, the influence of the event found diminishing with declining average percentage

of Catholics in the potentially treated populations in Europe.

5. Concluding remarks

In this paper, the impacts of the Catholic Jubilee Year religious event, and the related custom of the remission of sins, on crime levels recorded in Catholic countries were examined. The empirical investigation began with an analysis of historical time series data on Italian crimes recorded annually from 1888 to 2013. During this period, eight Jubilee Year events were celebrated by the Catholics of Italy, providing an opportunity to observe the impacts of several identical religious policy shocks on one country's population's behaviour. The time series analysis revealed that, for at least half of the Jubilee Year occasions, the number of criminal offences declined right before or during the event, then plateaued for three years. After this period of relative stability, the number of recorded crimes corrected upwards, approximately reaching pre-event levels. In the case of the Great Jubilee of 2000, the decrease during the event was so substantial that, after the event was over, crime levels first partially corrected and then stabilized.

In the context of the mandatory conditions required to obtain the Jubilee indulgence, such observed criminal behaviour of Catholics can be interpreted as follows. The initial decline in recorded crimes could reflect the faithful's detachment from all sins, while the subsequent stabilization could be related to the promises made not to sin again, which were kept for a limited period of time only. The criminal plateau levels, distinctive around each Jubilee event, likely indicated the level of "subsistence" crimes at that time, as if professional thieves and other criminals who made a living from committing crimes could not avoid minimal criminality, even if religious.[60] The following correction upwards could be associated with

[60]In technical analysis language, such a stage in trading is called "support," indicating the level where demand is strong enough to stop the stock from falling any further. Here, the support is expressed in the amount of crimes committed.

compensation for the period of abstention from crimes or simply a "fading away" of the event's impact. Several insights and suggestions can be derived from this observation.

Firstly, the pattern observed around the religious event in focus is well-defined, with a particular "double-top" shape, familiar from the technical analysis of financial data. Repeatedly detecting such a complex structure around a specific religious event for a macro-economic indicator like crime levels, measured annually at the country level, offers an opportunity to incorporate technical analysis alongside the fundamental approach in policy-making, especially when the timing of the pattern occurrence and its duration are known. In this specific case, the pattern can be rationalized.

Secondly, such a shape was already modelled by Behavioural theorists decades ago and was labelled as "binges and cold turkeys" or "bi-modal equilibrium".[61] The "bi-modality" implies that agents "sin" following a pattern where spells of abstention are replaced by periods of excessive consumption of damaging in the future good(s), and vice versa. In this paper, a spiritual restart was followed by a three-year-long spell of effectively exercised self-control and a one-time peak of compensation for such prolonged abstention.

A valid question to ask in connection with the remarks above is: What if there are other latent and unknown factors that could cause crimes to behave in such a structured manner? The truth is that crimes recorded annually at the country level are a very volatile indicator. Even during the most prosperous and peaceful times, many economic, political, social, legal, and other factors push and pull crimes in different directions. That is, a plateau, even a short-lasting one, is never detected. "Accidentally" observing a complex structure that includes three years of stability in recorded crimes, a few times over a hundred years in one country, is a zero probability event.[62] On the contrary, only a strong will of a substantial

[61]For reference, see Becker and Murphy (1988).

[62]It is hard to even imagine a situation under which crime levels at the country level would stabilize for three years. The only case that sounds plausible is a COVID-style full lockdown, where the opportunities to physically commit some crimes were significantly reduced. On the other hand, no nation would tolerate

fraction of the country's population could cause crimes to stabilize despite the fact that the number of opportunities to sin remained unchanged.

Thirdly, and more practically, what policy improvements can be offered based on the observed behavioral pattern? While it is inappropriate for the author to express an opinion on how to hold such events, or on their timing and frequency, some policy recommendations, in a purely civil sense, can still be made. In particular, the allocation of public funds assigned to law enforcement and incarceration budgets could be optimally adjusted according to the expected pattern of crimes around the event. Accommodating the estimated effects is feasible, as the event is declared well in advance of its occurrence and/or historically scheduled to be held every twenty-five years.[63] To give a concrete example of such a potential adjustment, the following policy improvement could be considered: When crimes are foreseen to decline during a particular Jubilee year due to religious reasons, fewer police resources may be sufficient to handle law violations. Conversely, when a spike in crimes is expected, deploying more officers on the streets could provide adequate protection for citizens.

More broadly, the quasi-experimental design of the religious shock in focus provided us with a golden opportunity to empirically observe what people do when they are forgiven and granted a fresh start. The findings suggest that they diligently try to avoid bad deeds for as long as their willpower lasts, and finally succumb to temptation. An interesting question arising from this result is: Could we observe the same behaviours around secular amnesties? To illustrate this point, consider the following two examples, macro-based and micro-based, respectively.

It is quite common that after a major armed conflict resolution, an amnesty is declared, granting all participating parties a fresh start free from repercussions. After a certain period of relative peace, it is possible that we would observe another peak of violence. Forecast-

such closure if imposed for three years.

[63] In Italy.

ing the exact timing of such an explosion could help peacemakers mitigate its impacts by employing international forces and other measures to prevent further development of the conflict in a timely manner.

If we look at the dimension of personal amnesties, e.g., amnesties granted to all sorts of criminals by presidential decrees or amnesties tied to important national celebrations, estimating the timing of the next recidivistic episode could help social services reach potential returning criminals just in time when their willpower to avoid bad deeds weakens. For private agents, this approach could even extend to any damaging in the future activity or consumption that requires self-control, such as drinking, gambling, overeating, and more.

The second part of the study was implemented as conditional analysis, where the same religious occasion influences were investigated using a panel dataset on European countries' crimes recorded around the Great Jubilee of 2000 planetary event. In the longitudinal data sample, predominantly Catholic countries served as treated units of observation, while the rest of the countries performed as a control group. In this case, the same one-time religious occasion's impacts were studied across nations. The event in focus was found to have a negative and significant impact on crimes recorded in treated countries in 2000. Furthermore, the magnitude of the estimated coefficient of the event occurrence on crime levels weakened when the set of treated units of observation was extended to include countries with a lower percentage of Catholics in the population.

Additional macro-economic indicators, when added as independent variables in the analysis, provided expected signs and revealed significant in explaining crime recorded data patterns. Specifically, urban population shares, changes in inflation rates, and continuous Catholic shares were estimated to be positively correlated with the number of crimes committed per annum, while being an ex-Communist country suppressed the levels of criminal offences recorded.

The longitudinal setting is compatible with a comparative look at the same religious

shock, potentially allowing for additional spillovers of the forgiveness obtained by Catholics to be estimated. In the realm of demographics, the dynamics of abortions and divorces could transform, expected to exhibit a one-time temporary decline or a complex structure with a compensation spike, respectively, as the decision not to divorce, unlike childbirth, can be easily reversed in the future. Subjective well-being indicators, if positively impacted by the release from the burden of sins, could bring a spark in productivity and innovation. Volunteering and charitable giving are expected to thrive in the time-proximity to the event, as Catholics were directly instructed to be involved in "good works". Of particular interest would be an increase in funds donated not to the Church itself but to education, arts, and research *and* development, as such donations could catalyse the beginning of new cycles of expansion in these areas, leading to a permanent shift to a higher level of performance.

To finalize the concluding remarks for the study, the Jubilee Year event's impacts on crime levels were examined using different empirical approaches over two distinctive datasets, extracted from two independent statistical bureaus: ISTAT and EuroStat. The types of crimes included by the two bureaus varied substantially. In the Italian historical time series, multiple events were observed over a long period of time, while in the panel dataset, a unique event of the same spiritual nature was celebrated in many European countries, settled by religiously heterogeneous populations. In both cases, the empirical examination results showed that criminal offence patterns of Catholics change in the time-proximity to the event and the related massive distribution of the remission of sins. More specifically, crimes committed were estimated to decline during or prior to the event, for both datasets.

This observation contradicts the hypothesis that suggests the faithful, when given the opportunity to cancel the afterlife punishment for sinning, would commit more bad deeds. According to Catholic doctrine, this fact can be explained as follows: when forgiven and the punishment is cancelled, Catholics entirely clean their spiritual debt and move from the stage of fearing God's judgement to a renewed and better connection with God - a phase of

love. The threat of Purgatory is removed, at least temporarily, and the gates of heaven are now open. To achieve this transition, the faithful are willing to make and keep promises not to sin again for as long as they can, indicating that fear may not be the only motivation for sinning or not sinning.

On a larger scale, the results of the study indicate that a deeper rethinking of the concept of forgiveness, obtained from the almighty God or otherwise, and its consequences, is required. While this study attempts to make a modest contribution to this important matter, many questions related to this topic are still open for future research.

Declaration on competing interest

None.

Data availability

All the datasets used in this article are publicly available and can be accessed free of charge from the sources described in the paper.

Appendix A. Supplementary tables

Table A.1: Fixed effects estimates of crimes: the Jubilee Year event effect.

Dependent variable: crimes per 100,000 inhabitants	(1)	(2)	(3)	(4)
$Catholic\ majority_{i,t} \cdot Jubilee_{2000}$	-3.64***	-2.43***	-2.33***	-2.26***
	(0.40)	(0.66)	(0.70)	(0.65)
$Catholic\ share_{t-1}$	-0.25***	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
$Urban\ population\ share_{t-1}$		2.26***	2.26***	2.00***
		(0.06)	(0.06)	(0.07)
$Change\ in\ inflation\ rates_{t-1}$			1.01**	0.08*
			(0.37)	(0.42)
$PostCommunism_i$				-9.81***
				(0.07)
Year FE	Y	Y	Y	Y
R^2	0.08	0.50	0.50	0.52
$R^2 - adjusted$	0.04	0.05	0.05	0.50
σ_u^2	144.86	125.13	168.86	142.30
σ_e^2	3,065	2.265	2,260	2,231
ρ	0.002	0.003	0.006	0.004
AIC	7,353	7,118	7,026	7,017

Notes. The unit of observation is crimes per 100,000 citizens in country i at year t. All columns include a constant. Standard errors, reported in parentheses, adjusted for cluster heteroscedasticity at the year level. Asterisks ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively. R^2-adjusted is extracted using equivalent *areg* command. σ_u^2 is the variance of the annual fixed effects, while σ_e^2 is the variance of the idiosyncratic error. ρ indicates the fraction of variance due to fixed effects. Post-estimation Akaike Information Criterion (AIC) calculated for each column. All the coefficients reported and the standard errors related, except inflation rates change, are divided by 100, as shares in the data were given as numbers and not percentages. Majority stands for higher than 50%+1 share of Catholics in the population. $n = 390$ in columns (1) and (2) and $n = 385$ in columns (3) and (4) due to a few missing observations for inflation rates in post-Communism countries. For column (4) full specification of model (2), within variation accounts for 0.52, while between variation equals 0.29.

Table A.2: Fixed effects of crimes per 100,000 citizens: Annual coefficients.

Dependent variable: crimes per 100,000 inhabitants		
Year	1994	-3.09***
		(0.09)
	1995	-3.14***
		(0.41)
	1996	-4.23***
		(0.16)
	1997	-4.21***
		(0.01)
	1998	-2.86***
		(0.01)
	1999	-2.94***
		(0.01)
	2000	-2.06***
		(0.04)
	2001	-2.88***
		(0.01)
	2002	-1.50***
		(0.02)
	2003	-1.41***
		(0.02)
	2004	-2.30***
		(0.02)
	2005	-3.96***
		(0.02)
	2006	-4.86***
		(0.02)
	2007	-5.38***
		(0.02)

Notes. Annual fixed effects complementary to Table 11, column (4), estimation results. The unit of observation is crimes per 100,000 citizens in country i at year t. Standard errors, reported in parentheses, adjusted for cluster heteroscedasticity at the year level. Asterisks ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively. 1993 is omitted as a baseline default year in Stata. All the coefficients reported, and the standard errors related, are divided by 100.

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