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God, Guilt, and Giving:
Public Good Contribution among Catholics and Protestants*

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Abstract

This paper examines how religious ethic influences contributions to public goods. We develop a theoretical model distinguishing individualistic motivations—where people seek to meet individual moral standards—from collectivistic motivations—where behavior is guided by others' expectations. We argue that the Protestant ethic emphasizes individual responsibility, while the Catholic ethic places greater weight on social expectations. The model predicts that the Protestant contribution share increases with income, whereas the Catholic contribution share is non-monotonic. Moreover, Catholics' overall contribution is relatively higher at lower-middle incomes and lower at higher-middle incomes, while there is no denominational difference in the decision whether to contribute at all. The model also implies that only Catholics' contributions are sensitive to the religious composition of their environment. We test these predictions using data from the German Socio-Economic Panel, exploiting variation within individuals. Consistent with the theoretical model, we find (*i*) no denominational differences at the extensive margin; (*ii*) at the intensive margin, donations increase with income among Protestants and remain flat among Catholics. These results hold when using the denomination of the parents, suggesting intergenerational transmission of religious ethics. Our findings highlight the role of religious moral structures in shaping cooperative behavior and public-good provision.

Keywords: Public Good, Religion, Individualism, Collectivism, Guilt Aversion

JEL Codes: D91, H41, Z12

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1 Introduction

A relatively recent and fast-growing stream of research has recognized religion as a significant cultural factor influencing human behavior and, consequently, economic outcomes. Religious prescriptions differ across denominations along several dimensions, and an extensive literature examines their impact on individual preferences, which in turn shape economic outcomes at both the microeconomic and macroeconomic levels (Iannaccone, 1998; Hungerman, 2014; Iyer, 2016; Carvalho et al., 2019; Becker et al., 2025, 2024; Bisin et al., 2019, 2023).[1]

In this paper, we focus on one particular dimension of religion: the *individualistic* versus the *collectivistic* religious ethic. With the term individualistic, we refer to the concept of having a direct personal relationship with God, whereby religious ethic is independent of what the others think or expect. In contrast, a collectivistic approach emphasizes and prioritizes the group and its expectations over the individual. Typically, religions display both types of components, with a different relative importance. As religious ethic influences human decisions, people with a more individualistic ethic assign less importance to social concerns in the decision-making process compared to those with a more collectivistic ethic (Cohen et al., 2005; Cohen and Hill, 2007).

We present a theoretical framework to study the implications of individualistic versus collectivistic religious ethic on economic outcomes, focusing specifically on public good contribution. We then bring our model to the data by studying voluntary donations of Catholics and Protestants in the context of modern Germany. In fact, we believe that the proposed theory can be used to characterize different denominations. Yet, we think that this theory is best seen at play when considering Catholics and Protestants.

Sociologists like Max Weber and Émile Durkheim studied Protestantism and Catholicism as examples of individualistic and collectivistic religious ethic, respectively (Durkheim, 1897; Weber, 1905). Martin Luther's Protestant theology placed a new focus on the individual's direct relationship with God. The Protestant doctrine revolved around three main principles (*solae*) which determined salvation: scripture over tradition, faith over works, and grace over merit. This was different from the Catholic doctrine, which favored membership and collective works over faith only. Therefore, Protestants developed an individual notion of faith and morality, while Catholics were encouraged to find truth through the community of the Church. Consistent with this notion, the literature finds that Catholics exhibit higher levels of introjected motivation, driven by guilt and social pressure. In contrast, Protestants display more identified motivation, reflecting internalized and individualistic values (Sheldon, 2006).

[1] Among other things, religion affects labor-force participation and productivity by encouraging (or discouraging) work effort (Spenkuch, 2017; Hornung et al., 2023), fertility choices and thus economic growth in the aggregate (de la Croix and Delavallade, 2018), innovation and technology adoption (Bénabou et al., 2015; Bénabou et al., 2022), the emergence of modern science and long-run growth patterns (Andersen and Bentzen, 2022), the implementation of different types of institutions and the consequent accumulation of human capital (Cinnirella et al., 2023), cooperation, trust and public good contribution (Putnam et al., 1994; La Porta et al., 1997; Norenzayan, 2013; Della Lena et al., 2023).

Theoretically, we consider a model in which individuals, with heterogeneous and privately observed income, decide their level of contribution to a public good. These individuals are motivated by both material and religious concerns. The religious component of the utility allows for both individual and social concerns, so as to describe the individual-social spectrum of religious motivations discussed above. Specifically, agents may care about both (*i*) meeting a fixed contribution share target that does not depend on others' behavior or belief (individualistic concern), and (*ii*) not disappointing others' expectations on their own level of contribution (collectivistic concern). For the individualistic component of the utility, we follow the literature on personal norms and identity, where agents seek to align their actions with what they perceive as morally correct (e.g., Akerlof and Kranton, 2000, 2005; Della Lena and Dindo, 2024; Li and Wang, 2025). In modeling how the collectivistic component of religious ethics influences agents' decisions, we refer to the literature on belief-dependent motivation (see Battigalli and Dufwenberg, 2022, for a survey). Specifically, the mechanism we employ is guilt aversion, as introduced by Battigalli and Dufwenberg (2007).[2]

In the paper, we first derive, as a benchmark, the optimal contribution behavior of individuals who live in a homogeneous society that attributes a generic weight (equal across the whole population) to the two components of the religious utility. We then model the distinction between Catholics and Protestants, where the two groups differ in their religious utility, i.e., in the weight that they attribute to the individual or social component. Theoretically, we define individuals as Protestants if they give more weight to the individualistic component and Catholics if they give more weight to the belief-dependent component. While we acknowledge that both motivations are present in both denominations, for ease of analysis, we focus on extreme types of preferences, in which Protestants' religious motivations are only individualistic and Catholics' ones are only collectivistic. With this specification, we first focus on homogeneous societies in which individuals are all Catholics or all Protestants. We find that the Protestants' share of contribution to the public good monotonically increases with income, while this is not the case for Catholics. Moreover, the two religious ethics imply different contribution patterns only for intermediate levels of income. In this range, Catholics are more likely to over-contribute for relatively low incomes and to under-contribute for relatively high incomes. This result is driven by the Catholic attitude to care about matching the expected contribution level.

Our analysis also considers heterogeneous societies composed of both Protestants and Catholics and investigates how the public good contribution of individuals who belong to one religious group is affected by the religious composition of their social environment. We find that the religious composition affects only the behavior of Catholics, by affecting their level of contribution, but not the non-monotonic share pattern. Moreover, we show that the Catholics' average level of contribution depends on the observability of religious denominations and on the Protestants'

[2] A first link between guilt aversion, trust, and religion is established by Della Lena et al. (2023). Alternatively, we could model the collectivistic component as originating from conformism and social norms (e.g., Bernheim, 1994; Ushchev and Zenou, 2020), obtaining similar predictions. We chose the guilt aversion approach because it does not require observability of own or others' actions, and because of its greater flexibility, particularly when modelling features of heterogeneous societies.

ability to understand that Catholics are motivated by different religious ethics. Specifically, the average level of contribution of Catholic individuals remains the same as in Catholic homogeneous societies when denomination is observable, and Protestants display *perfect empathy*, i.e., they expect Catholics to behave according to their true utility function.

The theoretical analysis provides three predictions that we bring to the data. First, as religious ethics do not impact the contribution behavior of individuals with low income, we predict no differences between Catholics and Protestants in terms of their extensive margin of contribution. Second, given the different individual patterns of contribution, we expect Catholics' contribution to respond less to income increases compared to the Protestants' one. Third, given their non-monotonic contribution share, we expect Catholics to contribute relatively more than Protestants for lower-middle incomes, and relatively less for higher-middle incomes.

We test empirically the main predictions of the model using individual-level data from the German Socio-Economic Panel (SOEP). Germany constitutes an ideal laboratory given its historical heterogeneity between Catholics and Protestants under the same set of institutions.[3] The SOEP dataset contains self-reported information on religious denomination, income, and voluntary donations. We consider the latter as a good proxy for public good contribution.

Importantly, the panel structure of the data allows us to exploit variation *within* individuals. This is crucial as we can account for time-invariant individual preferences and cultural attitudes, which can affect voluntary donations. Furthermore, we account for state-specific changes over time by including state-by-survey-year fixed effects. These are particularly important as there might be systematic differences across States which change over time. At the end, our sample consists of about 4,500 individuals observed in the years 2010, 2015, 2018, and 2020.

OLS estimates with individual and state-by-survey-year fixed effects show that there are no differences between denominations for donations at the extensive margin, i.e., the probability of donating increases with income with the same slope for both Protestants and Catholics. Instead, at the intensive margin, we find that donations of Protestants increase with income, whereas Catholics show a flat response to changes in income. This result is fully consistent with the predictions of our theoretical model. Consistently, we find suggestive evidence that the differences in contribution between Protestants and Catholics are most significant at higher income levels. Furthermore, we find that differences in contribution between denominations are larger when there is less information on individual income. This last result is obtained by analyzing the response of employed vs. self-employed individuals, assuming that self-employed individuals convey less information on income.

Finally, we analyze whether and to what extent *parents*' religious affiliation affects individual choices regarding voluntary donations. This approach allows us (i) to include in the regression also non-religious individuals who might have strategically opted out of the church for tax reasons; (ii) to speculate whether denomination-specific moral attitudes towards public good contribution are transmitted intergenerationally. Indeed, we find qualitatively the same results when using parents' denomination: If the parents are Catholic, the individual's response to increases in income

[3] We will account for the federal nature of German political and economic institutions.

is flatter compared to Protestants. These results also hold when adding to the sample about 1,500 individuals reporting being non-religious but with religious parents.

Related Literature This paper contributes to the literature on the economics of religion, pioneered by Iannaccone (1998), who provided a comprehensive survey of theoretical and empirical advances on religious participation, market structures, and the economic implications of religious institutions. In particular, we contribute to the theoretical literature that examines the role of religious identity and norms in shaping economic behavior, and cooperative behavior in particular. Levy and Razin (2012) model how religious beliefs sustain cooperation through perceived divine rewards and punishments, leading to the formation of religious organizations. Levy and Razin (2014) analyze how Calvinist doctrines of predestination and moral discipline, reinforced by institutional monitoring, foster cooperation through self and social signaling.[4] These contributions highlight the importance of religion as a system of moral incentives that shapes both internal motivations and social expectations. We contribute to this literature by modelling a further dimension of religion that affects cooperation, namely the individualistic vs. collectivistic dimension, and by showing how religious ethics differently located on this scale affect public good contributions.

In our model, guilt is a key psychological mechanism through which religious ethics manifests. In spirit, it is related to two recent theoretical contributions that emphasize the role of guilt in shaping behavior. On the individualistic side (self-directed guilt), Li and Wang (2025) develop a unified model that micro-founds Weber's typology of transcendental religions, showing how the quest for psychological salvation through obedience to a sacred commandment—and the guilt of inevitable failure—makes faith self-reinforcing and particularly appealing in insecure environments. On the collectivist side (guilt aversion), Della Lena et al. (2023) model the intergenerational transmission of guilt aversion as a religiously rooted moral emotion that sustains trust and cooperation in large societies, showing how beliefs in moralizing gods and shared guilt norms foster prosocial behavior even in anonymous environments.

We also contribute to the literature that investigates how religion, and Christian denominations in particular, affect cooperation and public good contribution. Earlier works in this literature argue that more hierarchical and authority-based denominations, such as Catholicism, associate with lower levels of civic cooperation and public-good provision compared to less hierarchical denominations, such as Protestantism (Putnam et al., 1994; La Porta et al., 1997). Gruber and Hungerman (2007) and Hungerman (2005) show that church activities substitute for government activities. In particular, their studies find that faith-based charities substitute for government redistribution. Complementary work by Chaudhary and Rubin (2016) shows that, in the context of India, rulers' religious identity affects public good provision, and that the effect is influenced by

[4]Related theoretical work studies religion as an institutional system shaping economic behavior through alternative channels. For example, Carvalho (2013) models veiling as a commitment mechanism enabling economic participation while preserving religious identity; Carvalho and Sacks (2021) analyze how religious competition, discrimination, and economic development affect community cohesion; and Seror (2018) models religious prohibitions as tools for institutional control.

both the religious composition of the State and the presence of privately provided public goods to a specific religious group.

Research closely related to our setting, such as Benjamin et al. (2016), investigates how denominational identity affects public good contributions. They find that religious priming decreases contributions for Catholics and increases them for Protestants. Moreover, only for the former does the effect operate through changes in beliefs rather than preferences, an interpretation consistent with our modeling of belief-dependent preferences. Additionally, there is evidence suggesting that Protestants and Catholics differ in economic attitudes, which are highly correlated with public good contribution. For example, Protestants display a relatively lower willingness to cheat on taxes and to take bribes (Guiso et al., 2003). Other experimental studies further confirm that religion shapes cooperative and moral behavior. Among these, Warner et al. (2018) document cross-country differences in civic engagement related to religion, emphasizing the community-based motives that drive Catholics' generosity, while Fazio et al. (2024) experimentally test Weber's "Protestant Ethic" hypothesis, showing that a blessed religious framing reduces redistribution among low-income Protestants by legitimizing inequality through divine favor.

Finally, we also contribute to the broad literature that explores the economic consequences of individualistic and collectivistic religious traits.[5] In addition to the above-mentioned Cohen et al. (2005) and Cohen and Hill (2007), Becker and Woessmann (2018) suggest that Protestant communities are characterized by higher individualism and weaker social cohesion, leading to higher suicide rates, whereas the stronger communal ties among Catholics act as a protective factor. They link this effect to differences in community integration and theological doctrine among Protestants and Catholics. Similarly, Arruñada (2010) highlights how differences in religious ethics affect the organization of social and economic exchange, showing that Protestantism promotes more impersonal and rule-based interactions, while Catholicism is associated with relational and community-oriented modes of cooperation. Taken together, these studies suggest that religious doctrines may shape not only moral attitudes but also the structure of social interactions and collective behavior.

Individualism and collectivism have also been studied in the context of economic growth. Gorodnichenko and Roland (2017) study the extent to which individualism (as opposed to collectivism) affects long-run growth. As individualism is a cultural trait that emphasizes personal freedom and achievements, the authors argue that individualism can have a positive effect on innovation. In contrast, collectivism tends to emphasize conformity, thus discouraging individuals from dissenting and standing out. Based on cross-country variation, the authors find a significant effect of individualism on income per worker, TFP, and innovation. In Gorodnichenko and Roland (2011), the authors confirm that individualism-collectivism is the only cultural dimension that matters for long-run growth. More recently, individualism has also been studied in relation to exposure to the geographical frontier. Bazzi et al. (2020) show that, in the context of nineteenth-

[5]The general concepts of individualism and collectivism have also been widely studied by social and cultural psychologists. See for example Hofstede (1980, 1991) and Triandis (1995, 2001).

century U.S., counties with more frontier experience exhibit more individualism, opposition to redistribution, and less public goods provision.

The paper is structured as follows: Section 2 introduces the baseline model, where both the individualistic and the collectivistic component coexist, and derives its comparative statics; Section 3 analyzes the two types of homogeneous societies—a society with only Protestants, and a society with only Catholics—and compares them; Section 4 studies the behavior of individuals of both denominations in heterogeneous societies; Section 5 puts forward the testable hypotheses and presents the empirical analysis; Section 6 concludes.

2 The Baseline Model

Consider a society composed of a set of agents $N = \{1, ..., n\}$, who are motivated by monetary utility and religious concerns. Each agent i is endowed with an income w_i, where agents' incomes are private information, i.i.d., and each $w_i \sim U[0, \bar{w}]$, with $\bar{w} \geq 2$.

Agents play a public good contribution game. The game is such that each agent i chooses to contribute to the public good with a share τ_i of his own income w_i—i.e., i's contribution is $g_i := \tau_i w_i$. Thus, the public good is given by $G := \sum_{j \in N} g_j = \sum_{j \in N} \tau_j w_j$ and the average contribution is $g := G/n$. We call $\tau = (\tau_1, ..., \tau_n)$ the profile of contribution shares.

Each agent's utility is composed of three components: (i) the utility of the disposable income; (ii) the utility of the public good; (iii) a utility coming from religious beliefs of complying with social norms or expectations of others. Specifically,

$$u_i(\tau, w; \lambda, \tilde{\tau}, \alpha) = \underbrace{log\Big((1-\tau_i)w_i\Big) + \sum_{j \in N} \tau_j w_j}_{material\ utility} \ \underbrace{- \theta \rho(\tau_i; \lambda, \tilde{\tau}, \alpha)}_{religious\ utility}, \tag{1}$$

where θ is the weight that the agent assigns to compliance with religious ethics.[6] Specifically, religious ethics has two components: agents care about a **fixed contribution share target** $\tilde{\tau} \in [0, 1/2]$, where $\tilde{\tau}$ is exogenous,[7] and, also, they care about abiding by others' expectations on contribution levels. We model this last component with the tools of psychological game theory, by assuming that agents are guilt-averse and they have a disutility from disappointing others' expectations. These expectations are described by the profile of first-order beliefs α, where the generic element $\alpha_{ji} := \mathbb{E}_j[g_i] = \mathbb{E}_j[\tau_i w_i]$ represents the beliefs that individual j has on i's contribution to

[6] We could assume heterogeneity in θ. However, we are interested in the effects of the different attitudes towards others and norms rather than in the heterogeneity in the intensity of those attitudes.

[7] We restrict $\tilde{\tau} \in [0, 1/2]$ to reflect that religious prescriptions for giving typically involve a moderate share of income and do not exceed half of it. Technically, this range keeps the equilibrium thresholds within a reasonable domain, preserving the richness of the comparative statics without collapsing the model into a trivial region or violating feasibility for low-income individuals. Importantly, while $\tilde{\tau}$ is bounded by $1/2$, the contribution share τ_i can exceed this bound in equilibrium, so the restriction does not limit the range of outcomes. Note that $\tilde{\tau}$ could also be a descriptive norm that describes average past behavior. This is consistent with our model in that the contribution target is fixed at the time of agents' choices.

the public good g_i (Battigalli and Dufwenberg, 2007; Battigalli et al., 2019). We call λ the relative weight of the two components of the religious ethic. Hence, the religious utility is specified as

$$\rho(\tau_i; \tilde{\tau}, \lambda, \alpha) := \max\Big\{0, [(1-\lambda)\tilde{\tau} w_i + \lambda \bar{\alpha}_i] - \tau_i w_i\Big\}, \tag{2}$$

where $\bar{\alpha}_i := \frac{1}{n-1} \sum_{j \in N \setminus \{i\}} \alpha_{ji}$ is the average of the beliefs that individuals j different from i have on i's contribution to the public good. Given that agent i does not know j's first-order belief α_{ji}, he consults his second-order belief $\beta_i = \mathbb{E}_i[\alpha]$. The feature of i's second-order belief that is relevant for our problem is $\beta_{ij} = \mathbb{E}_i[\alpha_{ji}]$ and, thus, $\bar{\beta}_i = \mathbb{E}_i[\bar{\alpha}_i]$.

We consider the Bayesian Sequential Equilibrium of this game (see Battigalli et al., 2019). Proposition 1 characterizes the agents' equilibrium contribution levels given their individual incomes, and the average individual contribution, g. Note that beliefs are assumed to be correct in equilibrium, and therefore equilibrium behavior no longer depends explicitly on second-order beliefs. To better understand how agents' best replies depend on their second-order beliefs, we refer the reader to Lemma 1 in the Appendix, which derives individual best replies given β_i.

Proposition 1 (Individual and average contribution) *Consider the public good contribution game in which utilities are described by equations (1) and (2). Let us define the thresholds* $\underline{w} := \frac{1}{1+\theta}$, $w^* := \frac{1+\lambda g(1+\theta)}{(1+\theta)(1-(1-\lambda)\tilde{\tau})}$, $w^{**} := \frac{1+\lambda g}{1-(1-\lambda)\tilde{\tau}}$.

The individual optimal contribution of each $i \in N$ satisfies

$$\tau_i = \begin{cases} 0 & \text{if} \quad w_i \leq \underline{w} \\ 1 - \frac{1}{w_i(1+\theta)} & \text{if} \quad w_i \in (\underline{w}, w^*] \\ (1-\lambda)\tilde{\tau} + \lambda \frac{g}{w_i} & \text{if} \quad w_i \in (w^*, w^{**}] \\ 1 - \frac{1}{w_i} & \text{if} \quad w_i > w^{**} \end{cases}, \tag{3}$$

where the average individual contribution is

$$g = \frac{(\bar{w}-1)^2 - (\bar{w}^2 - 2\bar{w} + \underline{w}^2)(1-\lambda)\tilde{\tau}}{2\left(\bar{w}(1-(1-\lambda)\tilde{\tau}) - (1-\underline{w})\lambda\right)}, \tag{4}$$

which is always (weakly) increasing in θ and $\tilde{\tau}$, and it is increasing in λ if and only if

$$\tilde{\tau} \leq \frac{(1+\bar{w}^2-2\bar{w})(1+\theta)^2}{1+\bar{w}(1+\theta)\left(\bar{w}-(1-\bar{w})\theta\right)}.$$

Proposition 1 shows that, for very low incomes, the optimal contribution rate is zero, because the marginal utility of individual consumption of the disposable income is so high that it is offset neither by the individual utility from public good contribution, nor by the religious component. As a matter of fact, at $\tau_i = 0$ individuals experience a disutility from the religious component because they contribute less than the convex combination of what is prescribed by the fixed contribution share target (with weight $1-\lambda$) and what others expect (with weight λ). However, the marginal

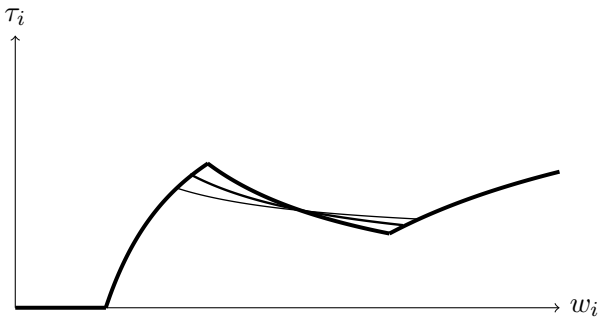
disutility from the religious component is smaller than the marginal utility of private consumption of income, when $w_i < \underline{w}$.

For levels of income higher than $\underline{w}$, agents start contributing to the public good with positive amounts. Specifically, they contribute $1 - \frac{1}{w_i(1+\theta)}$, which is increasing in the individual income level w_i. In this range, however, agents experience again a disutility from the religious component for the same reasons described for $\tau_i = 0$.

When $w_i = w^*$, the agent's contribution of a share $1 - \frac{1}{w_i(1+\theta)}$ implies that his contribution level $\tau_i w_i$ coincides with the morally optimal level of contribution, that is, $(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\beta}_i = (1-\lambda)\tilde{\tau}w_i + \lambda g$, and the agent therefore aims to maintain it. This, however, implies that his contribution rate is decreasing, because the component of the optimal contribution that depends on others' expectations is defined in terms of contribution level (which is observable) and not in terms of contribution rate (which is not).

Finally, for $w_i > w^{**}$, there is another region in which the contribution rate is increasing, due to the fact that the marginal utility of disposable income is decreasing, while the marginal utility of public good contribution is not. Figure 1 shows this pattern for different values of λ, where thinner lines correspond to lower values of λ. In detail, the lower λ the higher the weight associated with $\tilde{\tau}$ and thus, coherently with the reasoning above, the flatter the oblique part.

FIGURE 1: Optimal contribution share as a function of individual income. Thinner lines correspond to lower values of λ ($\tilde{\tau} = 1/3$, $\lambda = 0.2, 0.6, 1$).



3 Protestants and Catholics

We now introduce religious denominations. Each agent $i \in N$ can be either *Protestant* (P) or *Catholic* (C). The utility function in equations (1) and (2) describes individuals of both denominations. However, individuals of different denominations assign different weights to the two components of the religious utility. As a general definition, we assume that Protestants care more about the fixed contribution share target $\tilde{\tau}$, i.e., $\lambda_P < \frac{1}{2}$, while Catholics give more weight to the guilt aversion component, i.e., $\lambda_C > \frac{1}{2}$.

This assumption is based on different grounds. First of all, there is a large body of literature suggesting that Protestants' religious motivations are mostly individual, whereas Catholics' ones have a more prominent social component (Cohen and Hill, 2007; Cohen et al., 2005). This literature also shows that Catholics display a strong form of social religious motivation characterized by guilt, while Protestants demonstrate traits that reflect more individualistic and fully internalized motivations. Indeed, Catholics' religious practices may be influenced by social pressures, whereas Protestants tend to internalize their motivations more, due to their individualistic ethics (Sheldon, 2006).

Additional evidence in support of our assumption can be found in the experimental results of Benjamin et al. (2016). The authors show that religious priming influences behavior in a public good contribution game for both Protestants (contributions increase) and Catholics (contributions decrease). However, the mechanisms through which public good contribution is affected by religious priming are different across denominations: Catholics change their public good contribution because they change their expectations on the contributions of others (both own contribution and expectation on others' contribution decrease after religious priming); Protestants, instead, increase their contribution to the public good even though they do not change their expectation on the contribution of others. This finding is consistent with our assumption that Catholics care about others' expectations more than Protestants.

Further evidence in support of our assumption comes from the World Values Survey (WVS) and the European Values Study (EVS), respectively a global and a European survey that, among others, explore values and beliefs of individuals. Given our assumption that Protestants follow an individual religious ethic, whereas Catholics give more weight to others' expectations, we expect Catholics to be relatively more insecure about which moral rules to follow and to be more sensitive to others' judgments. To test these assumptions, we use the following two questions from the World Values Survey (Wave 7, 2017-22) and the European Values Study (1981-2022):

- WVS: "How much do you agree or disagree with the statement that nowadays one often has trouble deciding which moral rules are the right ones to follow?" (1 Completely agree, 2, 3, . . . , 10 Completely disagree).
- EVS: "During the past few weeks, did you ever feel upset because somebody criticized you?"

We restrict the samples to individuals reporting being either Catholic or Protestant and estimate an OLS model using the answers to the above-mentioned questions as outcome variable and a dummy for being Catholic as independent variable.[8] The results reported in Table 1 show that, indeed, Catholics are worldwide more likely to agree with the statement on the difficulty of choosing the right moral rule to follow (column 1), and that they tend to be more upset by others' criticism (column 2), suggesting that Catholics care relatively more about other people's judgment.

[8] In both regressions we include fixed effects for survey year, gender, age, marital status, country, respondent born in country, number of children, educational level, employment status, level of religiosity based on church attendance, and 10 income groups.

TABLE 1: Moral rules, criticism, and religious denomination

	WVS	EVS
	(1)	(2)
	Moral rules to follow	Upset if criticized
Catholics	-0.014**	0.005*
	(0.007)	(0.003)
Controls	Yes	Yes
Observations	25053	111073
R-squared	0.04	0.13

Note: OLS estimates with robust standard error. In column 1, we use data from the World Values Survey (WVS); in column 2, data from the European Values Study (EVS). Controls include fixed effects for gender, age, marital status, country, respondent born in country, number of children, educational level, employment status, 10 income groups, level of religiosity based on church attendance, and survey year. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

In what follows, to isolate the main drivers of the two religious denominations, and also for ease of analysis, we focus on the extreme case in which Protestants and Catholics are characterized by $\lambda_P = 0$ and $\lambda_C = 1$, respectively. However, note that the comparison between the two denominations does not qualitatively change if we allow the more general definition of the denominations (see the comparative statics at the end of Proposition 1).

3.1 Protestant society

Let us begin by considering a society composed of only Protestant agents, with $\lambda_P = 0$. Recall that each agent i with income w_i will choose his level of contribution τ_i by maximizing his utility that now reads:

$$u_i(\tau, w) = log\Big((1-\tau_i)w_i\Big) + \sum_{j\in N} \tau_j w_j - \theta \max\Big\{0, \tilde{\tau} w_i - \tau_i w_i\Big\}. \tag{5}$$

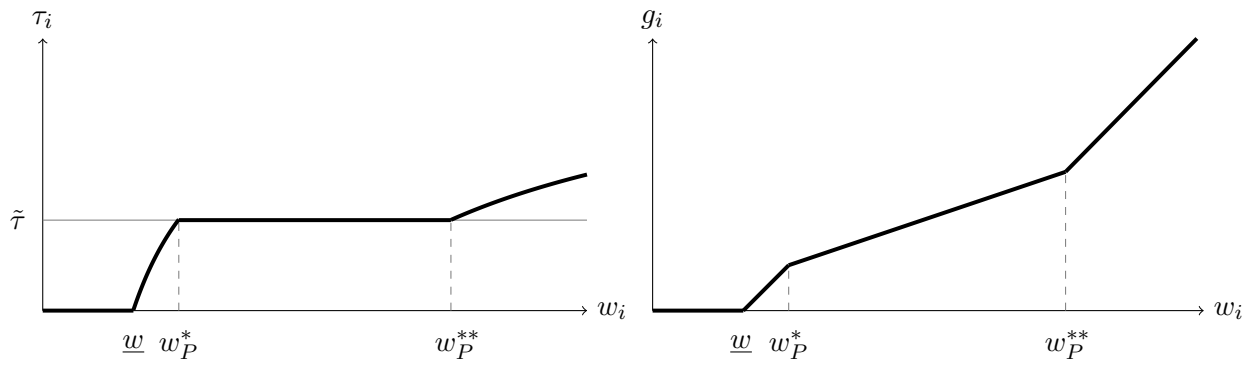
Note that equation (5) is obtained from equation (1) by setting $\lambda = 0$.

Corollary 1 characterizes the equilibrium individual choices and the average contribution in a Protestant society. Note that the thresholds defined in Corollary 1 are derived from the ones defined in Proposition 1 by setting $\lambda = 0$, i.e., $w_P^* := w^*|_{\lambda=0}$, and $w_P^{**} := w^{**}|_{\lambda=0}$. Also note that the threshold $\underline{w}$ is unchanged.

Corollary 1 (Protestant society) *Consider the public good contribution game in which utilities are described by equation (5). Let us define the thresholds* $\underline{w} := \frac{1}{1+\theta}$, $w_P^* := \frac{1}{(1+\theta)(1-\tilde{\tau})}$, *and* $w_P^{**} := \frac{1}{(1-\tilde{\tau})}$.

- *The individual optimal contribution share of each* $i \in N$ *satisfies*

FIGURE 2: Optimal contribution in a Protestant homogeneous society $\left(\theta = 2, \tilde{\tau} = \frac{1}{3}\right)$.



(a) Contribution share

(b) Contribution level

$$\tau_i = \begin{cases} 0 & \text{if } w_i \leq \underline{w} \\ 1 - \frac{1}{w_i(1+\theta)} & \text{if } w_i \in (\underline{w}, w_P^*] \\ \tilde{\tau} & \text{if } w_i \in (w_P^*, w_P^{**}] \\ 1 - \frac{1}{w_i} & \text{if } w_i > w_P^{**} \end{cases}. \tag{6}$$

- *The average contribution level is*

$$g^P = \frac{1 + (1 - \tilde{\tau})(\bar{w}^2 - 2\bar{w}) - \underline{w}^2\tilde{\tau}}{2\bar{w}(1 - \tilde{\tau})}, \tag{7}$$

  and it is always increasing in θ and $\tilde{\tau}$.

Figure 2 summarizes the optimal contribution share (left panel) and the optimal individual contribution level (right panel) as a function of the income, for a given target $\tilde{\tau}$. For low income levels ($w_i < \underline{w}$), agents do not contribute at all. Optimal contribution share instead increases until it reaches the fixed target $\tilde{\tau}$. Agents then, as they become richer, keep their contribution share to $\tilde{\tau}$ up to income w_P^{**} where the contribution share starts increasing again, as discussed earlier. As a consequence, the contribution level will always increase linearly, with different slopes in different regions, and it will increase at a slower rate in the region in which agents stick to the individual target $\tilde{\tau}$.

3.2 Catholic society

We now consider a society composed of only Catholic agents, with $\lambda_C = 1$. Each agent i with income w_i will choose her level of contribution maximizing her utility:

$$u_i(\tau, w, \alpha) = log\Big((1 - \tau_i)w_i\Big) + \sum_{j \in N} \tau_j w_j - \theta \max\Big\{0, \bar{\alpha}_i - \tau_i w_i\Big\}. \tag{8}$$

Similarly to what was done above, equation (8) is obtained from equation (1) by setting $\lambda = 1$.

Corollary 2 characterizes the equilibrium individual choices and the average contribution in a society composed of only Catholic agents. As before, the thresholds w_C^* and w_C^{**} derive from those in Proposition 1 with $\lambda_C = 1$, while $\underline{w}$ is unchanged.

Corollary 2 (Catholic society) *Consider the public good contribution game in which utilities are described by equation (8). Let us define* $\underline{w} = \frac{1}{1+\theta}$, $w_C^* := w^*|_{\lambda=1} \equiv \frac{1}{1+\theta} + g^C$, *and* $w_C^{**} := w^{**}|_{\lambda=1} \equiv 1 + g^C$.
The individual optimal contribution of each $i \in N$ *satisfies*

$$\tau_i = \begin{cases} 0 & \text{if} \quad w_i \leq \underline{w} \\ 1 - \frac{1}{w_i(1+\theta)} & \text{if} \quad w_i \in (\ \underline{w},\ w_C^*\ ] \\ \frac{g^C}{w_i} & \text{if} \quad w_i \in (\ w_C^*,\ w_C^{**}\ ] \\ 1 - \frac{1}{w_i} & \text{if} \quad w_i > w_C^{**} \end{cases}, \tag{9}$$

where the average contribution is

$$g^C = \frac{1 + \bar{w}^2 - 2\bar{w}}{2\,(\bar{w} - 1 + \underline{w})} \tag{10}$$

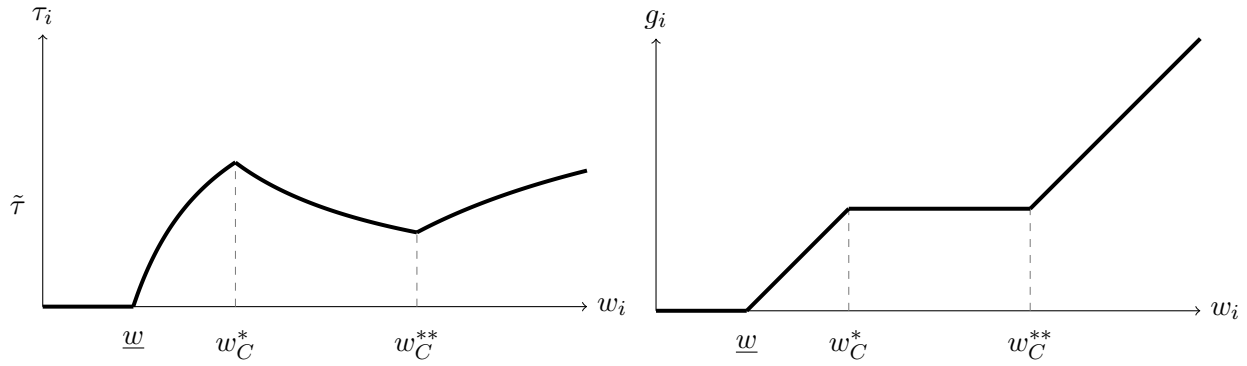
and it is always increasing in θ.

Figure 3a summarizes the behavior of a Catholic society both in terms of contribution share (left panel) and in terms of individual contribution level (right panel). Note that the optimal contribution share of Catholics is non-monotone, as was the general case of Section 2, because the Catholic component of the religious utility is what drives the non-monotonicity. Specifically, low-income Catholics start contributing zero, and then have an increasing contribution share up to the level of income at which they meet others' expectations. At that point, their contribution level remains constant, and therefore their contribution share decreases, giving rise to the non-monotone behavior of optimal shares. Then, again, for higher incomes, the contribution share starts to rise again, and so does the contribution level. Note that the non-monotone behavior of τ_i also derives from the fact that others' expectations are on the observable contribution level, and not about the privately observed contribution share. Despite the non-monotonic behavior of τ_i, the contribution level is weakly increasing in income, with a constant part in the region in which Catholics contribute exactly the amount that others expect from them.

3.3 Comparison between Protestant and Catholic societies

By comparing Figures 2 and 3a, we note that the contribution behavior does not depend on religious ethics for both low and high levels of incomes. This, in particular, implies that the extensive margin on public good contribution does not differ across denominations: both types of agents start contributing at income $w_i = \underline{w}$ (see equations (6) and (9)). This is the first testable implication of our model, and we summarize it in Remark 1.

FIGURE 3: Optimal contribution in a Catholic homogeneous society. ($\theta = 2$).



(a) Contribution share

(b) Contribution level

Remark 1 (Extensive Margin) *The level of income above which individuals start contributing ($\underline{w}$) is the same for Catholics and Protestants.*

The behavioral differences between Protestants and Catholics arise instead when agents have intermediate levels of income, that is, when religious ethics determine behavior. Remember that Catholics care about the expected contribution level, and Protestants care about compliance with a fixed contribution share target. As a consequence, Catholics with lower-middle-income contribute with a higher share than higher-middle-income ones. Whether and how much Catholics over-contribute and/or under-contribute with respect to Protestants depends on the level of the target that Protestants have, $\tilde{\tau}$.

Figure 4 provides examples of the three possible comparisons across denominations, according to the relative behavior in the intermediate region: panels (a) show the case in which Catholic agents always contribute (weakly) more than Protestant ones, panels (b) the case in which there is both over- and under-contribution, and panels (c) the case in which Catholics always contribute (weakly) less than Protestants, for a given level of income. Specifically, in each pair of panels, the figure shows the behavior of Catholics and Protestants in terms of contribution share (left panel) and total individual contribution (right panel). Higher values of $\tilde{\tau}$ are associated with higher levels of contribution of Protestants, and therefore, higher levels of relative under-contribution of Catholics (in comparison with Protestants).

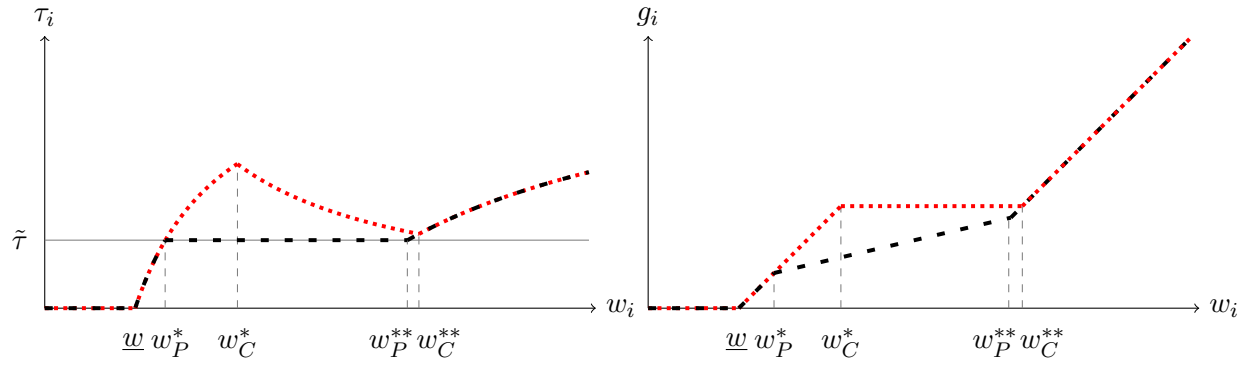
Proposition 2 characterizes these three regions and their comparative statics.

Proposition 2 (Intensive Margin) *Let $T_1 := \frac{(1-\bar{w})^2(1+\theta)}{1-\theta+\bar{w}^2(1+\theta)}$ and $T_2 := \frac{(1-\bar{w})^2(1+\theta)^2}{1+(\bar{w}-(1-\bar{w})\theta)^2}$. Then,*

1. *If $\tilde{\tau} \leq T_1$, then, for any w_i, Catholics' optimal contribution share is weakly higher than the Protestants' one;*

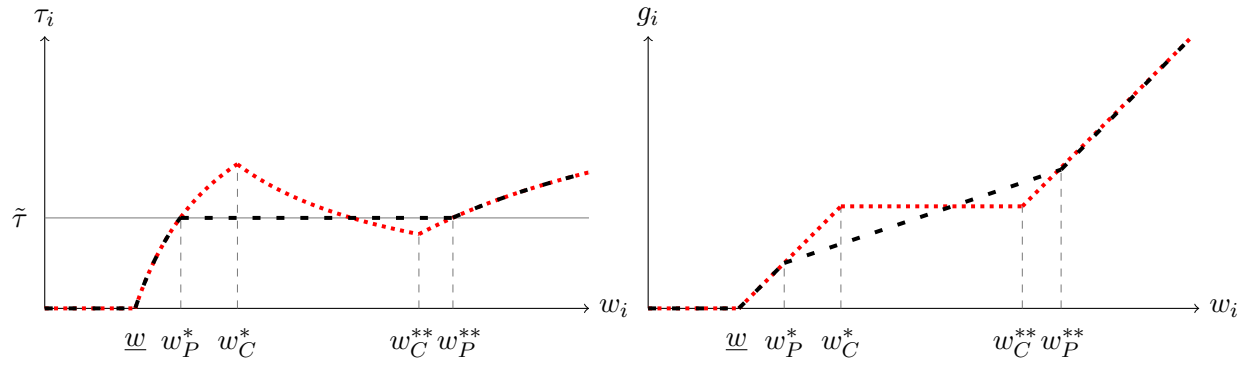
2. *If $T_1 < \tilde{\tau} < T_2$, then there exists $\tilde{w} \in (w_P^*, w_P^{**})$ such that Catholics' optimal contribution share is strictly higher than the Protestants' one in $(w_P^*, \tilde{w})$, whereas it is strictly lower in $(\tilde{w}, w_P^{**})$, where $\tilde{w} = \frac{g^C}{\tilde{\tau}}$;*

FIGURE 4: Protestant (black, dashed) and Catholic (red, dotted) optimal contribution when societies are homogeneous. Left panels report optimal contribution shares and right panels report optimal contribution level.



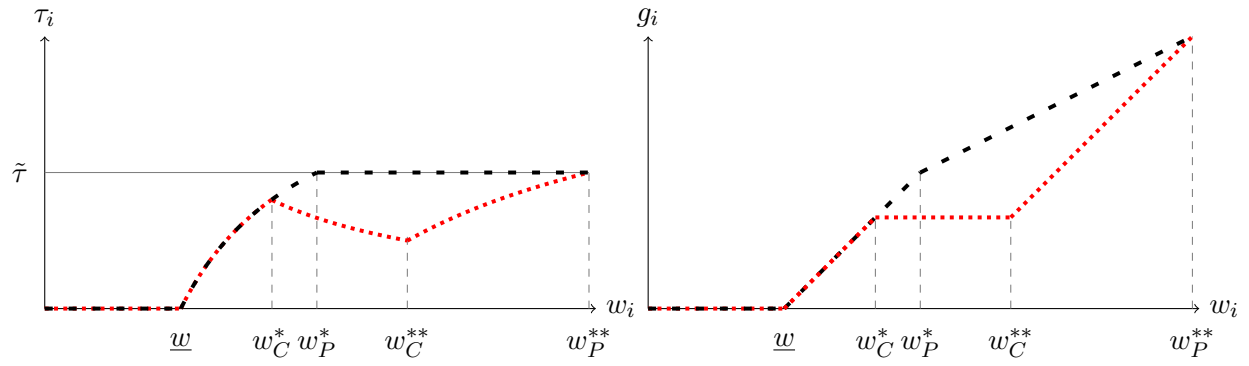
Contribution share Contribution level

(a) $\theta = 2$, $\tilde{\tau} = \frac{1}{4}$



Contribution share Contribution level

(b) $\theta = 2$, $\tilde{\tau} = \frac{1}{3}$



Contribution share Contribution level

(c) $\theta = 1$, $\tilde{\tau} = \frac{1}{2}$

3. *If $\tilde{\tau} \geq T_2$, then, for any w_i, Catholics' optimal contribution share is weakly lower than the Protestants' one.*

The comparison between denominations in terms of contribution share also has consequences on the comparison in terms of average public good contribution in the two societies. Recall that, under the simplifying assumption $\lambda_C = 1$, $\lambda_P = 0$, the average level of public good provision of Catholic societies, g^C does not depend on $\tilde{\tau}$, while the average level of public good provision in the Protestant society, g^P, is increasing in $\tilde{\tau}$. Corollary 3 below, derived from the comparison of equations (7) and (10), characterizes the threshold of $\tilde{\tau}$ above which the average level of public good contribution is lower in Catholic societies.

Corollary 3 (Public good provision across denominations) *Consider two homogeneous societies: a Catholic and a Protestant ones. The average level of public good provision g^C of the Catholic society ($\lambda_C = 1$) is lower than the average level of public good provision g^P of the Protestant one ($\lambda_P = 0$) if and only if $\tilde{\tau} > \frac{(1-\bar{w})^2}{\underline{w}^2 - \bar{w} + \underline{w}\bar{w} + \bar{w}^2}$.*

Note that, given $\underline{w} < 1$, and $\bar{w} > 1$, the threshold is always in the range $(0, 1)$.[9]

4 Heterogeneous Societies

We now consider societies where Catholics and Protestants live together. Even when analyzing the behavior of agents in heterogeneous societies, we denote with g^P (resp. g^C) the average contribution in a society composed only by Protestants (resp. Catholics).

Our first observation is that Protestants' behavior does not depend on the composition of the society: mathematically, this is because their behavior does not depend on others' expectations, but just on $\tilde{\tau}$; intuitively, this comes from the fact that their religious ethic is individualist. Remark 2 summarizes Protestants' behavior in heterogeneous societies.

Remark 2 (Protestants in heterogeneous societies) *Regardless of the composition of the society, the average contribution of Protestants is g^P, and their optimal contribution behavior is the one prescribed by equation (6).*

Catholics' behavior is instead influenced by two features of the *heterogeneous* society: (i) the observability of the religious denomination; (ii) the Protestants' ability (or lack of) to understand that Catholics are motivated by different religious prescriptions.

The first element is whether religion is an observable trait or not. Indeed, we talk of **observable denomination** when, while interacting, agents can observe the religion of the opponent. This can occur, for instance, in small villages where agents are familiar with each other's habits, culture, and traditions. In large cities, agents may signal their religion by enrolling their children in confessional

[9] This result holds (with a different threshold) also for the more general description of Catholics ($\lambda_C > \frac{1}{2}$) and Protestants ($\lambda_P < \frac{1}{2}$).

schools. Also, Catholics often wear a necklace with a cross, or with images of saints, whereas Protestants are less likely to do so. We talk instead of **non-observable denomination** when religion is a private characteristic and there is no way in which, during the interaction, agents can infer the religious trait of the opponent. This is more likely to happen in large villages and cities in which agents are less likely to know others and get known, or in countries in which the public display of religious signs does not find widespread social acceptance.

The second relevant feature of heterogeneous societies is the way in which Protestants form beliefs about Catholics' contribution behavior. In the first case, which we call **perfect empathy**,[10] each agent, when matched with a Catholic, has correct beliefs on the Catholic's utility function and contribution pattern. We talk, instead, of **imperfect empathy** when Protestants believe all the other agents to have their own religious ethic, and, therefore, utility function.

Given these two dimensions, we can distinguish four cases, which are analyzed in Proposition 3. The proposition shows that, even if there are four types of societies, Catholics' behavior can only converge to two different outcomes: if denomination is observable and there is perfect empathy, Catholics behave exactly as in a society that does not include Protestant agents; in all other cases, they converge to an outcome that depends on both the Protestants' average contribution and the Catholics' contribution in an homogeneous society, and they maintain the non-monotonic Catholics' shape of contribution shares.

Proposition 3 *Consider a society composed of a share p of Protestants and a share $(1-p)$ of Catholics and define $\phi(p) := \frac{p(1-\underline{w})}{p(1-\underline{w})+(\bar{w}-1+\underline{w})}$. Then, depending on the different assumptions about religious denomination observability and empathy, the Catholics' average contribution $g^{C,het}(p)$ is characterized as follows:*

TABLE 2: Equilibrium average Catholics' contributions

$g^{C,het}(p)$	**Non-Obs. Denomination**	**Obs. Denomination**
Perfect Empathy	$\phi(p)g^P + (1-\phi(p))g^C$	g^C
Imperfect Empathy	$\phi(p)g^P + (1-\phi(p))g^C$	$\phi(p)g^P + (1-\phi(p))g^C$

Moreover, individual contribution of Catholic agents is given by

$$\tau_i = \begin{cases} 0 & \text{if} \quad w_i \leq \underline{w}, \\ 1 - \frac{1}{w_i(1+\theta)} & \text{if} \quad w_i \in (\underline{w}, w_C^*] \\ \frac{g^{C,het}(p)}{w_i} & \text{if} \quad w_i \in (w_C^*, w_C^{**}] \\ 1 - \frac{1}{w_i} & \text{if} \quad w_i > w_C^{**} \end{cases} \tag{11}$$

To understand these results, consider first a society with observable denomination and perfect empathy. In this case, Catholics know that every other agent in the (heterogeneous) society expects them to behave as Catholics because (i) he is able to recognize them as Catholic (observable

[10] See Della Lena et al. (2023) for another application of the concepts of perfect and imperfect empathy in a psychological game theory model.

denomination) and (ii) he correctly identifies their preferences (perfect empathy). Since others' expectations (and not others' behavior) drive religious motivation for Catholics, in a heterogeneous society with observable denomination and perfect empathy, Catholics behave exactly as in a society where everyone is Catholic, as this is everyone's expectation of their behavior. In the presence of imperfect empathy (and observable denomination), instead, Catholics anticipate that Protestants expect g^P from them on average. Therefore, in equilibrium, their second order belief (i.e., their belief on what others expect from them) is $p \cdot g^P + (1-p) \cdot g^{C,het}(p)$, where p is the share of Protestants in the society, and $g^{C,het}(p)$ is the average contribution of Catholics in the heterogeneous society. As a consequence of the stickiness of Protestants' behavior, the average contribution of Catholics moves towards that of Protestants. Given that the weight $\phi(p)$ is increasing in p, this effect is stronger in societies with larger shares of Protestants.

Similar considerations apply to the case in which denomination is not observable, and therefore, with or without perfect empathy, Catholics' average contribution is anchored to the Protestants' one. However, the Catholics' individual behavior does not converge to the Protestants' one even in these three cases, as the Catholics' pattern of contribution as a function of income is still the non-monotonic one described in Section 3.2.

As a consequence, the comparison between Catholics' and Protestants' behavior in a heterogeneous society is most likely described by panels (b) of Figure 4, which is the most likely case when societies have sufficiently similar levels of average contribution. Panels (a) (resp. panels (c)) may describe the comparison between Catholics and Protestants only in a heterogeneous society with observable denomination, perfect empathy, and very low (resp. very high) contribution share target of the Protestants. Empirically, we expect to find the patterns described by panels (b) of Figure 4.

5 Empirical Analysis

We test empirically the validity of the theoretical model by documenting the extent to which Catholics and Protestants differ in terms of public good contributions in the context of Germany. Our theoretical model provides three main testable hypotheses. First, in any type of society, individuals start contributing to the public good from levels of income higher than $\underline{w}$. This holds for both Catholics and Protestants and both in homogeneous as well as heterogeneous societies. Hence, we expect to find no differences between denominations in the extensive margin of contribution, i.e., we expect that *Catholics and Protestants do not differ in terms of probability to make a contribution to the public good.*

The second prediction concerns the different responsiveness of individual contributions to income by religious denomination. Looking at the right panels of Figure 4, we note that Catholics are characterized by a pattern of contribution level that is flat for the region of middle incomes where we expect to have the highest number of observations. Hence, on average, we expect Catholics'

TABLE 3: Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
Donation (in-kind)	4653	0.29	0.46	0.00	1.00
Donation (Euros)	11627	322.24	1308.20	0.00	100000.00
Gross income (1000 Euros)	11627	3.44	2.62	0.01	29.00
Share of Catholics	11627	0.48	0.50	0.00	1.00
Share of Protestants	11627	0.52	0.50	0.00	1.00
Age	11627	48.12	10.62	18.00	85.00

Note: Descriptive statistics of our main variables. See Section 5.1 for a detailed description. Data source is the SOEP-CORE version 39.

contribution to respond less to income compared to the Protestants, i.e., we expect *Catholics' contribution to increase less with income compared to the contribution of the Protestants.*

Third, as argued at the end of Section 4, the comparison between Protestants and Catholics in heterogeneous societies is described by panel (b) of Figure 4. Therefore, we expect *Catholics to have contribution levels that are higher compared to the Protestants at lower-middle incomes, and lower compared to the Protestants at higher-middle incomes.*

5.1 Data and Methodology

We test the predictions of our model by exploiting information on religious denomination, income, and voluntary donations included in the German Socio-Economic Panel (SOEP) dataset.[11] The SOEP is a large, representative, multi-cohort, and multidisciplinary household survey in which about 30,000 individuals and 15,000 households are interviewed every year. Crucial for our analysis, the SOEP includes information on religious denomination, (self-reported) gross and net income, and the amount of voluntary donations. As for the latter, individuals are asked whether and how much they donate, distinguishing also between monetary and in-kind donations. In our empirical analysis, we use donations as a proxy for public good contributions.[12]

We restrict the sample to individuals who reported being either Catholic or Protestant with positive self-reported labor income.[13] Importantly, the panel structure of the SOEP allows us to exploit variation *within* individuals, i.e., we study how donations (i.e., public good contributions) respond to income variations within individuals by denomination. Accounting for individual fixed effects allows us to net out potential cultural norms or, more generally, time-invariant individual preferences that could affect our results.

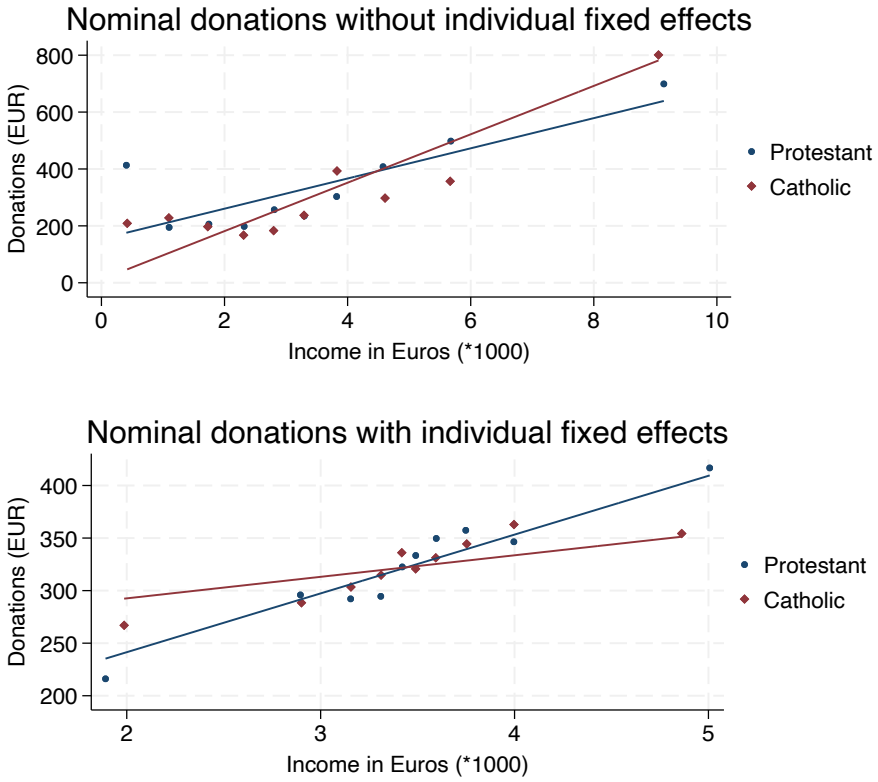
Our main regression sample consists of about 4,500 individuals observed in the following non-consecutive four years: 2010, 2015, 2018, and 2020. As reported in Table 3, the sample consists of

[11] We use the last released version, SOEP-CORE v40.1.

[12] These donations should be unrelated to church-taxes which are levied from the State on officially registered members of religious communities. See footnote 16 for more details.

[13] In section 5.4, we will relax the constraint of belonging to a denomination. Self-reported income refers to the monthly income. We drop from the dataset monthly incomes larger than 30,000 Euros as they are outliers that could bias our results. In any case, this exclusion does not change qualitatively our results.

FIGURE 5: Donations and income by denomination



Note: Binned scatterplot with 10 equally-spaced income bins and linear fit superimposed. Donations refer to annual contributions (in Euros). Gross monthly income in 1,000 Euros.

48 percent of Catholics and 52 percent of Protestants; the average monthly gross income is about 3,450 Euros; the average amount of yearly donation is 322 Euros; 4653 individuals answered the question on whether they made any in-kind donation. Finally, the average birth year is 1968, with the oldest individual born in 1930 and the youngest in 2000, with a mean age of 48 years.

In Figure 5 we display the relationship between donations and income by denomination through a binned scatterplot.[14] In the upper panel, we display the relationship without individual fixed effects, whereas in the lower panel, we account for individual-specific effects. There are two important features to be noted in this figure: (*i*) as expected, there is a positive relationship between income and donations; (*ii*) there is a difference in slope between Catholics and Protestants, i.e., the donation response to changes in income seems to vary by denomination. Importantly, as we account for individual fixed effects, the response of Catholics is flatter with respect to the Protestants (Figure 5, lower panel). This result is in line with the model predictions discussed above and further analyzed below.

[14] We have chosen 10 equally-sized income bins and imposed a linear fit.

5.2 Baseline Results

We estimate a standard OLS model with individual and time (i.e., survey-year) fixed effects, with standard errors clustered at the individual level:[15]

$$Y_{ist} = \gamma_i + \delta_{st} + \beta \, \text{Inc}_{ist} + \theta \, \text{Inc}_{ist} \times \text{Cath}_i + X'_{ist}\lambda + \varepsilon_{ist} \tag{12}$$

where Y_{ist} is our proxy for the contribution to the public good in the form of voluntary donations of individual i, in state s, and in survey-year t ($t = 2010, 2015, 2018, 2020$); γ_i and δ_{st} are, respectively, individual and state-by-survey-year fixed effects. Importantly, the latter control for state-specific institutional settings which might change over time and affect regulations about donations as well as regulations about church-tax and income deductions.[16] Inc_{ist} is self-reported gross income and Cath_i is an indicator variable for Catholic denomination. Since the religious denomination of the individual is time-invariant, the main effect for religious denomination is absorbed by the individual fixed effects. X_{ist} is a vector of control variables which may vary over time and includes fixed effects for age, marital, employment, and health status. The coefficient of interest is θ, which measures the extent to which donations vary with income for Catholics with respect to Protestants. Therefore, β measures the relationship between donations and income for Protestants.

The baseline results are reported in Table 4. We start by studying the extensive margin, that is, the choice between making or not making a donation. For this, we use the question in the SOEP on whether the individual donated any money in the previous year.[17] We consider this binary variable as outcome in column (1). It should be noted that our theoretical model predicts *no difference* by denomination in the probability of making a contribution to the public good. Indeed, we find that the probability of making a monetary donation increases with income for Protestants, but the interaction term does not indicate any differential response for Catholics. The questionnaire also contains a question on providing "private support" with in-kind donations.[18] We use this variable as a binary outcome in column (2). We find no relationship between income and in-kind donations for both denominations. In brief, the results on the extensive margin are consistent with the theoretical prediction of our model.

Next, in column (3), we investigate the intensive margin, which closely tests the predictions of our theoretical model. In this case, we use the monetary amount of yearly donations as outcome.

[15] Please note that the notation used for the coefficients is not related to the notation used in the theoretical model. In particular, β, θ, and λ of equation (12) are not the second-order beliefs, the relevance of the religious component of the utility, and the weight of others' expectations in the general form of the utility function.

[16] In Germany, the church-tax is levied on all registered members of the Catholic, Protestant, or other tax-collecting communities. The tax rate varies between 8% (in Bavaria and Baden-Wuerttemberg) and 9% (in the rest of Germany) of income tax. Therefore, there is no difference between the Catholic and Protestant church tax within a state.

[17] This is the question in the survey: "We understand donations to mean money given for social, religious, cultural, non-profit, and charitable purposes without the expectation of receiving anything directly in return. It can consist of larger sums or smaller sums like those saved in a piggy bank. We also consider offerings collected at church as donations. Did you donate money last year, not including membership fees?".

[18] The question reads: "A private support can also be given in the form of benefits, e.g. clothes, gifts, vacations, or restaurant visits. In the last year, have you personally given support in the form of benefits to relatives or other persons outside your household?".

TABLE 4: Baseline estimates

Dependent variable:	Voluntary Donations		
	Extensive margin		Intensive margin
	Money	In-kind	
	(1)	(2)	(3)
Income	0.008**	0.006	47.303***
	(0.004)	(0.007)	(12.157)
Income×Cath	0.002	-0.002	-38.637**
	(0.006)	(0.010)	(19.075)
Controls	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
State-by-survey-year FE	Yes	Yes	Yes
Observations	27028	4014	11627
Number of individuals	9864	2007	4533
R-squared	0.66	0.62	0.72

Note: OLS estimates with robust standard errors clustered at the individual level. Dependent variables: in column (1), it is a binary variable for whether the individual made a money donation; in column (2), a binary variable for whether the individual made an in-kind donation; in column (3), the amount of donation in Euros. All the models include individual fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

The estimates indicate that for every 1,000 Euros increase in (gross) monthly income, donations of Protestants increase by circa 47 Euros. Importantly, we find that for Catholics, this positive effect is largely offset, suggesting a flat response to changes in income. This result is broadly consistent with the predictions of our theoretical model.

The last prediction is that Catholics contribute *more* than Protestants at lower-middle income levels and *less* than Protestants at higher income levels (see Figure 4, right panels). In order to test this prediction, we split the sample into income terciles (computed over the income distributions by survey year) and run our baseline model as in equation 12. Indeed, the coefficients for the interaction term across the income terciles show a pattern from positive to negative (-33.5 in the third tercile).[19] Although the coefficients for the interaction terms are not statistically significant, the pattern of the coefficients is broadly consistent with the predictions of our theoretical model.

In fact, there is another feature of our theoretical model that can be tested empirically. As discussed above, the behavioral differences between Catholics and Protestants stem both from (*i*) Catholics' concern for others' expectations and (*ii*) from the fact that these expectations cannot be based on true individual income, which remains private information. A more realistic version of this second assumption would model others' expectations on individual income as dependent on observable traits such as the occupation type or the employment status. An extension of

[19]It is important to note that these specifications are quite data-demanding as the coefficients are identified over income variation within a tercile. This explains why the total number of observations in Table 5 is lower than in Table 4, column 3.

TABLE 5: Income heterogeneity

Dependent variable:	Voluntary Donations		
	I tercile	II tercile	III tercile
	(1)	(2)	(3)
Income	107.121	39.964	88.942**
	(193.017)	(35.119)	(35.805)
Income×Cath	39.671	5.138	-33.463
	(170.317)	(41.022)	(41.934)
Controls	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
State-by-survey-year FE	Yes	Yes	Yes
Observations	2282	2352	5128
Number of individuals	965	1013	1991
R-squared	0.63	0.82	0.88

Note: OLS estimates with robust standard errors clustered at the individual level. The dependent variable is the amount (in Euros) of voluntary donations. Columns 1–3 split the sample by income terciles. All the models include individual fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

the theoretical model to the case in which more information on income is available predicts that individuals with different incomes respond to different expectations. This differential response mitigates the flat reaction of Catholics' contribution to income because individuals at different income levels display a flat behavior around a heterogeneous expected contribution that increases with individual income. This, averaged in the population, mimics the Protestants' increasing contribution behavior. As a consequence, we expect to observe a larger difference in contributions between Catholics and Protestants when there is less information on individual income. Therefore, we predict that the difference found in the data originates from individuals whose income is less observable. In this context, it is reasonable to assume that *less* information on an individual's income is available when people are self-employed as opposed to employed people. Therefore, if we restrict our analysis only to employed and self-employed individuals, we can expect to find that the public good contribution of self-employed Catholics is further less responsive to incomes compared to employed Catholics (always taking the Protestants as the reference group).

To test it, we restrict our sample to individuals who reported being either employed or self-employed and kept their occupational status for the entire period of observation. In column (1) of Table 6, we show estimates of our baseline model on this subsample. The results confirm the previous results, that is, Catholics' response to an increase in income is flatter compared to Protestants. In column (2), we run a sort of "horse-race" model, differentiating the Catholic dummy between employed and self-employed. The point estimates suggest that, with respect to Protestants, self-employed Catholics tend to have a flatter response than employed Catholics ($p\text{-}value = 0.17$).

TABLE 6: Regression by type of employment

Dependent variable:	Voluntary Donations	
	(1)	(2)
Income	45.634***	46.028***
	(14.347)	(14.338)
Income×Cath	-35.655*	
	(20.257)	
Income×Cath employed		-26.171*
		(15.448)
Income×Cath self-employed		-47.151
		(34.029)
Controls	Yes	Yes
Individual FE	Yes	Yes
State-by-survey-year FE	Yes	Yes
Observations	10824	10824
Number of individuals	4235	4235
R-squared	0.87	0.87

Note: OLS estimates with robust standard errors clustered at the individual level. The dependent variable is the amount (in Euros) of voluntary donations. All the models include individual fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

Although the two coefficients for the interaction terms are not statistically different from each other, the magnitude of the coefficients points in the direction predicted by our theoretical model.

5.3 Robustness Checks

In our empirical analysis, we proxy contributions to the public good with voluntary donations and use self-reported monthly gross income as the main independent variable. It is reasonable to assume that donations might depend on the amount of income taxes. In order to account for individual, time-varying differences in income taxes, we leverage the self-reported information on net income provided in SOEP. We thus compute the individual annual income-tax burden by subtracting the net income from the gross income. In Table 7, we run our baseline estimates including such a constructed measure for income taxes. The results are both qualitatively and quantitatively similar to the baseline estimates presented in Table 4. We find no differences between Catholics and Protestants on the extensive margin (columns (1)-(2)), whereas there is a large and significant difference between Catholics and Protestants on the intensive margin (column (3)). Regarding the coefficients on taxes, they have a negative sign, as one would expect. Yet, the coefficients are never significantly different from zero.

Our baseline results on the intensive margin presented in Table 4 draw on about 4500 individuals. However, not all the individuals are observed in all waves, i.e., the panel is unbalanced. In

TABLE 7: Accounting for taxes

Dependent variable:	Voluntary Donations		
	Extensive margin		Intensive margin
	Money	In-kind	
	(1)	(2)	(3)
Income	0.013**	0.004	47.632**
	(0.006)	(0.014)	(19.609)
Income×Cath	0.002	-0.002	-38.617**
	(0.006)	(0.010)	(18.723)
Taxes	-0.010	0.004	-0.716
	(0.009)	(0.025)	(38.131)
Controls	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
State-by-survey-year FE	Yes	Yes	Yes
Observations	27028	4014	11627
Number of individuals	9864	2007	4533
R-squared	0.66	0.62	0.72

Note: OLS estimates with robust standard errors clustered at the individual level. Dependent variables: in column (1), it is a binary variable for whether the individual made a money donation; in column (2), a binary variable for whether the individual made an in-kind donation; in column (3), the amount of the donation in Euros. All the models include individual fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

order to test whether our results hold also when the panel is balanced, we "force" our sample to be balanced with $T = 3$. The estimates are reported in Appendix Table A.1. As expected, the lower number of observations and, above all, the lower level of variation within individuals make the estimates more unstable. Yet, all the models confirm the main pattern, i.e., Catholics tend to have a lower response to income with respect to Protestants, and this is consistent with the main prediction of our theoretical model.

5.4 Parents' Religious Affiliation

The individual choice to belong to a religious group could be endogenous to income. In fact, in Germany, one could opt out of a church (*Kirchenaustritt*) and thus stopping to pay church taxes which are directly levied by the state. Indeed, Spenkuch (2017) documents that economic success is an important determinant of selecting out of religion. In our case, systematic differences between Catholics and Protestants in opting out because of income could generate a selection bias.

One way to obviate such strategic behavior is to use the religious denomination of the parents (Spenkuch, 2017). Indeed, the SOEP asks the individuals about the religion of their parents so that we can estimate our baseline models using the parents' denomination instead of the individual's one. In fact, this approach provides two advantages: (*i*) we can include in the model

individuals who reported being non-religious but reported their parents being either Catholic or Protestant, thus attenuating concerns about self-selection; (*ii*) to the extent that parents' denomination does not perfectly predict the individual's denomination, we can implicitly test whether the moral attitudes that characterize Catholics and Protestants towards public good contribution are intergenerationally transmitted.[20]

The estimates using parents' religious affiliation are shown in Table 8. We separate the results into two blocks: in columns (1)–(3), we use the baseline sample in which the individuals consistently report being either Catholic or Protestant, and we use their parents' denomination; in columns (4)–(6), we add to the sample also those individuals who reported being non-religious. For each sample, we then estimate models using (*i*) the mother's denomination, (*ii*) the father's denomination, and (*iii*) both parents' denomination. In particular, when using both the mother's and the father's denomination (columns (3) and (6)), we constrain the reference group to have both a Protestant mother and father.[21]

The results obtained are relevant in the two dimensions discussed above. First of all, when we use the parents' denomination in our standard sample (columns (1)–(3)), we obtain similar results. That is, if the mother, the father, or both parents are/were Catholic, the individual's response to changes in income is flatter. In terms of magnitude of the coefficients, the result seems to be stronger when both parents are of the same denomination (column (3)). In the context of parental transmission of norms, this result would be consistent with the notion that the moral attitude is transmitted more strongly when it is shared by both parents.

Secondly, adding in the regression sample individuals who reported being non-religious does not change our main results. As one can see, also in this case the coefficients of the interaction terms consistently indicate a flatter response of individuals with Catholic parents. All the coefficients for the interaction terms with the extended sample are significant at the 10% level.

In sum, this last set of results suggests that the moral attitudes towards public good contribution of Catholics and Protestants as described in our theoretical model hold empirically also when considering parents' denomination. A possible interpretation is that such moral attitudes are transmitted intergenerationally. This interpretation is further backed up by the estimates that include non-religious individuals.[22] Finally, we can also argue that selecting out of a religion does not affect our results.

[20]The focus on parents' moral attitudes is consistent with the cultural transmission literature (e.g., Bisin and Verdier, 2001; Della Lena and Panebianco, 2021), where cultural and moral traits are transmitted across generations; see Bisin et al. (2023); Bisin and Verdier (2025) for recent surveys.

[21]In Appendix Table A.2 we present the results when relaxing this constraint.

[22]Unfortunately, there are not enough observations to estimate a model with only non-religious individuals.

TABLE 8: Parents' religious denomination

Dependent variable:	Voluntary Donations					
	Baseline sample			Extended sample		
	Mother (1)	Father (2)	Mother & Father (3)	Mother (4)	Father (5)	Mother & Father (6)
Income	39.087***	38.622***	33.579**	29.904***	29.808***	28.967***
	(11.925)	(12.500)	(14.266)	(8.344)	(8.291)	(10.743)
Income×Cath	-27.591			-23.665*		
	(21.677)			(14.209)		
Income×Cath		-29.965			-27.983*	
		(22.396)			(15.625)	
Income×Cath			-37.479*			-28.659*
			(22.585)			(16.451)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
State-by-survey-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11627	11627	5782	15461	15461	6677
Number of individuals	4533	4533	2250	6097	6097	2610
R-squared	0.72	0.72	0.84	0.71	0.71	0.83

Note: OLS estimates with robust standard errors. The dependent variable is the amount (in Euros) of voluntary donations. In columns (1)–(3), the baseline sample, we include individuals with reported religious affiliation. In the extended sample in columns (4)–(6) we include also individuals with no-religious affiliation. All the models include individual fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

6 Conclusions

In this paper, we propose a characterization of Catholic and Protestant religious ethics that is based on their differences along the individualism-collectivism dimension. We derive the theoretical implications of such characterization in a public good contribution game, and we validate the model empirically by looking at voluntary donations of Protestants and Catholics in Germany. In particular, we test the predictions of the model using panel data that report information on voluntary donations, income, and religion. Estimations of models with individual and state-by-survey-year fixed effects show, consistently with the theory, that Catholics' donations increase in income less than Protestants' ones, i.e., the Catholics' response to changes in income is flatter than the Protestants' one. Also consistent with the model, we provide some evidence that differences in donations between Protestants and Catholics are larger at higher levels of income and that differences are larger when there is less information on individual income. Interestingly, we also find evidence consistent with the intergenerational transmission of moral attitudes.

Although our empirical analysis targets a specific context, the theoretical model that we propose is substantially broader in scope in two important ways. First, our distinction between Catholic and Protestant ethics—interpreted along an individualistic–collectivistic spectrum—can be generalized to make predictions regarding a broader range of economic behaviors. Second, the analytical framework is not confined to Christianity: traits of other religions can be located along the same cultural spectrum. For example, Cohen et al. (2005) argues that both individual and collective motivations are important in Judaism, while Islam is typically classified as a collectivistic religion (see, for example, Warner et al., 2018). This allows the model to generate testable predictions for a much wider share of the world's population, thereby providing a useful theory-driven approach for future empirical studies in the economics of religion.

More broadly, the model can be adapted to investigate other cultural or institutional settings in which the balance between individual concerns and collective responsibility plays a central role. By adapting our framework that models the impact of the individualistic–collectivistic dimension, researchers can systematically compare how different societies sustain public-good provision and other forms of cooperative behavior. In this way, our framework offers not only a reinterpretation of historical religious differences, but also a versatile tool for analyzing contemporary issues of social cohesion, civic engagement, and economic development.

A Proofs and additional results

A.1 Lemma 1

Lemma 1 *Consider the game described by equation (1). The individual optimal contribution of each $i \in N$ depends on his second-order beliefs as follows*

$$\begin{cases} \tau_i = 1 - \frac{1}{w_i(1+\theta)} & if \quad \tau_i < (1-\lambda)\tilde{\tau} + \lambda\frac{\bar{\beta}_i}{w_i} \\ \tau_i = 1 - \frac{1}{w_i} & if \quad \tau_i \geq (1-\lambda)\tilde{\tau} + \lambda\frac{\bar{\beta}_i}{w_i} \end{cases} \tag{13}$$

Proof. Each agent chooses his level of contribution by maximizing the utility in eq. (1). The FOCs of agent i are implicitly defined by

$$\begin{cases} -\frac{1}{1-\tau_i} + w_i + \theta w_i = 0 & if \quad \tau_i < \mathbb{E}_i\left[\frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\alpha}_i}{w_i}\right] \\ -\frac{1}{1-\tau_i} + w_i = 0 & if \quad \tau_i \geq \mathbb{E}_i\left[\frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\alpha}_i}{w_i}\right] \end{cases}. \tag{14}$$

Recalling that $\bar{\beta}_i = \mathbb{E}_i[\bar{\alpha}_i]$, we can write

$$\begin{cases} -1 + w_i(1+\theta) - \tau_i w_i(1+\theta) = 0 & if \quad \tau_i < \frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\beta}_i}{w_i} \\ -1 + w_i - \tau_i w_i = 0 & if \quad \tau_i \geq \frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\beta}_i}{w_i} \end{cases}, \tag{15}$$

from which we get

$$\begin{cases} \tau_i = 1 - \frac{1}{w_i(1+\theta)} & if \quad \tau_i < \frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\beta}_i}{w_i} \\ \tau_i = 1 - \frac{1}{w_i} & if \quad \tau_i \geq \frac{(1-\lambda)\tilde{\tau}w_i + \lambda\bar{\beta}_i}{w_i} \end{cases}. \tag{16}$$

■

Proof of Proposition 1

Let us first observe that equation (13) in Lemma 1 characterizes agent i's best reply given his second-order beliefs. Recall that $\bar{\beta}_i = \mathbb{E}_i[\bar{\alpha}_i] = \mathbb{E}_i[\mathbb{E}_j[g_i]]$. Since $g_i = \tau_i w_i$ and w_i is private information drawn from a commonly known distribution, we have $\mathbb{E}_j[g_i] = \mathbb{E}_j[\tau_i w_i] \equiv \mathbb{E}_j[g]$.

As we are focusing on Bayesian Sequential Equilibria, we restrict attention to equilibria in which beliefs are correct. Thus, $\bar{\alpha}_i = \mathbb{E}_j[g] \equiv g$, so that $\bar{\beta}_i = \mathbb{E}_j[\bar{\alpha}_i] \equiv \bar{\alpha}_i$ from which it follows that $\bar{\beta}_i = \bar{\alpha}_i = g$. Therefore, for all i, best response satisfies:

$$\begin{cases} \tau_i = 1 - \frac{1}{w_i(1+\theta)} & if \quad \tau_i < \frac{(1-\lambda)\tilde{\tau}w_i + \lambda g}{w_i} \\ \tau_i = 1 - \frac{1}{w_i} & if \quad \tau_i > \frac{(1-\lambda)\tilde{\tau}w_i + \lambda g}{w_i} \end{cases}. \tag{17}$$

Let us first notice that from the first condition, that $\tau_i = 1 - \frac{1}{w_i(1+\theta)} \leq 0$ when $w_i \leq \underline{w} = \frac{1}{1+\theta}$. Since negative contributions are not allowed, the generic agent i optimally chooses $\tau_i = 0$ for all $w_i \leq \underline{w}$.

Let us now determine the range of incomes over which the agent strictly prefers to match their religious prescription, that is, chooses $\tau_i = (1-\lambda)\tilde{\tau} + \frac{\lambda g}{w_i}$. We derive the lower-bound w^* as the income level w_i at which the agent i is indifferent between contributing $1 - \frac{1}{w_i(1+\theta)}$ and the religious prescription:

$$\begin{aligned}
\left(1 - \frac{1}{(1+\theta)w_i}\right) w_i &= (1-\lambda)\tilde{\tau} w_i + \lambda g \\
w_i - \frac{1}{1+\theta} &= (1-\lambda)\tilde{\tau} w_i + \lambda g \\
\Rightarrow w^* &= \frac{\underline{w} + \lambda g}{1 - (1-\lambda)\tilde{\tau}}.
\end{aligned}$$

Similarly, the upper bound w^{**} is the income level at which the agent is indifferent between the religious prescription and contributing $\tau_i = 1 - \frac{1}{w_i}$:

$$\begin{aligned}
\left(1 - \frac{1}{w_i}\right) w_i &= (1-\lambda)\tilde{\tau} w_i + \lambda g \\
w_i - 1 &= (1-\lambda)\tilde{\tau} w_i + \lambda g \\
\Rightarrow w^{**} &= \frac{1 + \lambda g}{1 - (1-\lambda)\tilde{\tau}}.
\end{aligned}$$

Therefore, the agent i's optimal contribution share is:

$$\tau_i = \begin{cases} 0 & \text{if} \quad w_i \leq \underline{w}, \\ 1 - \frac{1}{w_i(1+\theta)} & \text{if} \quad w_i \in (\ \underline{w},\ w^*\ ] \\ (1-\lambda)\tilde{\tau} + \lambda \frac{g}{w_i} & \text{if} \quad w_i \in (\ w^*,\ w^{**}\ ] \\ 1 - \frac{1}{w_i} & \text{if} \quad w_i > w^{**} \end{cases}, \tag{18}$$

where $\underline{w} = \frac{1}{1+\theta}$, $w^* = \frac{\underline{w}+\lambda g}{(1-(1-\lambda)\tilde{\tau})}$, $w^{**} = \frac{1+\lambda g}{(1-(1-\lambda)\tilde{\tau})}$.

Let us compute the average contribution $g = \mathbb{E}[\tau_i w_i]$. Note that $w^* < w^{**}$ always. We first assume $w^{**} < \bar{w}$ to compute g, and then verify that the resulting g satisfies this consistency condition, since w^{**} itself depends on g. Since the income is uniformly distributed over the interval $[0, \bar{w}]$, the average contribution becomes:

$$
\begin{aligned}
g &= \frac{1}{\bar{w}}\left[\int_0^{\underline{w}} 0\ dw_i + \int_{\underline{w}}^{w^*}(w_i - \frac{1}{(1+\theta)})\ dw_i + \int_{w^*}^{w^{**}}((1-\lambda)\tilde{\tau}w_i + \lambda g)\ dw_i + \int_{w^{**}}^{\bar{w}} w_i - 1\ dw_i\right] \\
&= \frac{1}{\bar{w}}\left[\left[\frac{w_i^2}{2} - \frac{w_i}{(1+\theta)}\right]_{\underline{w}}^{w^*} + \left[(1-\lambda)\tilde{\tau}\frac{w_i^2}{2} + \lambda g w_i\right]_{w^*}^{w^{**}} + \left[\frac{w_i^2}{2} - w_i\right]_{w^{**}}^{\bar{w}}\right] \\
&= \frac{1}{2\bar{w}}\left[w^{*2} - \underline{w}^2 - 2\underline{w}(w^* - \underline{w}) + (1-\lambda)\tilde{\tau}(w^{**^2} - w^{*2}) + 2\lambda g(w^{**} - w^*) + \bar{w}^2 - 2\bar{w} - w^{**2} + 2w^{**}\right].
\end{aligned}
$$

Let us recall that both w^* and w^{**} depend on g, if we define $\xi := \frac{1}{1-(1-\lambda)\tilde{\tau}}$ we see that

$$
\begin{cases}
(w^{**} - w^*) = \xi(1 - \underline{w}) \\
(w^{**^2} - w^{*2}) = (1 - \underline{w})\xi^2(1 + \underline{w} + 2g\lambda) \\
-w^{**2} + 2w^{**} = \xi(1 + g\lambda)(2 - \xi(1 + g\lambda))
\end{cases}.
$$

We can thus write

$$
2\bar{w}g = \underbrace{(\xi(\underline{w} + \lambda g))^2}_{A} - \underline{w}^2 - 2\underline{w}\Big(\xi(\underline{w} + \lambda g) - \underline{w}\Big) + (1-\lambda)\tilde{\tau}(1-\underline{w})\xi^2(1 + \underline{w} + 2g\lambda) + 2\lambda g\xi(1-\underline{w}) + \underbrace{\xi(1+g\lambda)(2 - \xi(1+g\lambda))}_{B} + \bar{w}^2 - 2\bar{w}. \tag{19}
$$

Notice that g has quadratic terms only in terms A and B of the RHS. Let's expand them:

$$
A := (\xi(\underline{w} + \lambda g))^2 = \xi^2(\underline{w}^2 + (\lambda g)^2 + 2\underline{w}\lambda g)
$$

and

$$
\begin{aligned}
B := \xi(1 + g\lambda)(2 - \xi(1 + g\lambda)) =& 2\xi(1 + g\lambda) - \xi^2(1 + g\lambda)^2 \\
& 2\xi(1 + g\lambda) - \xi^2(1 + (g\lambda)^2 + 2g\lambda).
\end{aligned}
$$

Summing the two, the quadratic parts disappear and we get

$$
\begin{aligned}
A + B =& \xi^2(\underline{w}^2 + 2\underline{w}\lambda g) + 2\xi(1 + g\lambda) - \xi^2(1 + 2g\lambda) \\
=& 2\xi + \xi^2(\underline{w}^2 - 1) + 2\xi^2\underline{w}\lambda g + 2\xi g\lambda - 2\xi^2 g\lambda \\
=& 2\xi - \xi^2(1 - \underline{w}^2) + 2\xi g\lambda(1 - \xi(1 - \underline{w})).
\end{aligned}
$$

Thus, substituting $A + B$ in equation (19), and then solving for g, we get

$$
\begin{aligned}
2\bar{w}g =& 2\xi - \xi^2(1 - \underline{w}^2) + 2\xi g\lambda\Big(1 - \xi(1 - \underline{w})\Big) - \underline{w}^2 - 2\underline{w}\Big(\xi(\underline{w} + \lambda g) - \underline{w}\Big) + (1-\lambda)\tilde{\tau}(1-\underline{w})\xi^2(1 + \underline{w} + 2g\lambda) + 2\lambda g\xi(1-\underline{w}) + \bar{w}^2 - 2\bar{w} \\
=& 2\xi - \xi^2(1 - \underline{w}^2) + 2\xi g\lambda(1 - \underline{w})\Big(2 - \xi + (1-\lambda)\tilde{\tau}\xi\Big) + \underline{w}^2 - 2\underline{w}^2\xi + (1-\lambda)\tilde{\tau}(1-\underline{w})\xi^2(1 + \underline{w}) + \bar{w}^2 - 2\bar{w}
\end{aligned}
$$

$$\Rightarrow g = \frac{2\xi - \xi^2(1-\underline{w}^2) + \underline{w}^2 - 2\underline{w}^2\xi + (1-\lambda)\tilde{\tau}(1-\underline{w})\xi^2(1+\underline{w}) + \bar{w}^2 - 2\bar{w}}{2\bar{w} - 2\xi\lambda(1-\underline{w})\Big(2-\xi+(1-\lambda)\tilde{\tau}\xi\Big)}$$
$$= \frac{\underline{w}^2 + (1-\underline{w}^2)\xi\Big(2-\xi+(1-\lambda)\tilde{\tau}\xi\Big) + \bar{w}^2 - 2\bar{w}}{2\bar{w} - 2\xi\lambda(1-\underline{w})\Big(2-\xi+(1-\lambda)\tilde{\tau}\xi\Big)}. \tag{20}$$

Recalling that $\xi = \frac{1}{1-(1-\lambda)\tilde{\tau}}$ after some algebra we get

$$g = \frac{1 - \underline{w}^2(1-\lambda)\tilde{\tau} + (\bar{w}^2 - 2\bar{w})(1-(1-\lambda)\tilde{\tau})}{2\left(\bar{w}(1-(1-\lambda)\tilde{\tau}) - (1-\underline{w})\lambda\right)}. \tag{21}$$

We now verify that $w^{**} \leq \bar{w}$ holds under the relevant parameter domain.

$$\begin{aligned} w^{**} \leq \bar{w} &\iff \frac{1+\lambda g}{1-(1-\lambda)\tilde{\tau}} \leq \bar{w} \\ &\iff 1 + \lambda g \leq \bar{w}(1-(1-\lambda)\tilde{\tau}) \\ &\iff \tilde{\tau} \leq \frac{\bar{w} - 1 - \lambda g}{\bar{w}(1-\lambda)}. \end{aligned} \tag{22}$$

Note that the RHS of (22) is increasing in λ whenever $g < \bar{w} - 1$. Moreover, at $\lambda = 0$ it reduces to $\frac{\bar{w}-1}{\bar{w}} \in \left(\frac{1}{2}, 1\right]$, which is always strictly larger than $\tilde{\tau} \in (0, \frac{1}{2})$. Thus, $g < \bar{w} - 1$ is a sufficient condition ensuring $w^{**} \leq \bar{w}$.

$$\begin{aligned} g &< \bar{w} - 1 \\ \frac{1 - \underline{w}^2(1-\lambda)\tilde{\tau} + (\bar{w}^2 - 2\bar{w})(1-(1-\lambda)\tilde{\tau})}{2\left(\bar{w}(1-(1-\lambda)\tilde{\tau}) - (1-\underline{w})\lambda\right)} &< \bar{w} - 1 \\ 1 - \underline{w}^2(1-\lambda)\tilde{\tau} + (\bar{w}^2 - 2\bar{w})(1-(1-\lambda)\tilde{\tau}) &< (\bar{w}-1)\Big(2\left[\bar{w}(1-(1-\lambda)\tilde{\tau}) - (1-\underline{w})\lambda\right]\Big) \\ \underbrace{1 - \bar{w}^2 + \tilde{\tau}(\bar{w}^2 - \underline{w}^2)}_{<0} + \lambda\Big(\underbrace{2(1-\underline{w})(\bar{w}-1) - \tilde{\tau}(\bar{w}^2 - \underline{w}^2)}_{=:Y}\Big) &< 0. \end{aligned} \tag{23}$$

Note that Y is composed of a positive term, $2(1-\underline{w})(\bar{w}-1)$, and a negative term, $-\tilde{\tau}(\bar{w}^2 - \underline{w}^2)$, so it is the only component that may offset the strictly negative part. Since $\lambda \in [0,1]$, the largest possible value of the LHS of (23) arises at $\lambda = 1$ whenever $Y > 0$. Thus, it suffices to verify the inequality for $\lambda = 1$, which provides a sufficient condition for negativity for all $\lambda \in [0,1]$.

$$\begin{aligned} 1 - \bar{w}^2 + \tilde{\tau}(\bar{w}^2 - \underline{w}^2) + 2(1-\underline{w})(\bar{w}-1) - \tilde{\tau}(\bar{w}^2 - \underline{w}^2) &< 0 \\ 1 - \bar{w}^2 + 2(1-\underline{w})(\bar{w}-1) &< 0 \\ -1 - \bar{w}^2 + 2\bar{w} - 2\underline{w}(\bar{w}-1) &< 0 \quad \text{(always holds for } \bar{w} \geq 2 \text{ and } 0 < \underline{w} < 1). \end{aligned}$$

Comparative statics We now study how the average contribution depends on θ, $\tilde{\tau}$, and λ.

Let us first consider θ and let us notice that

$$sign\left(\frac{\partial g}{\partial \theta}\right) = -sign\left(\frac{\partial g}{\partial \underline{w}}\right).$$

where

$$\begin{aligned}
\frac{\partial g}{\partial \underline{w}} &\propto -\lambda - \underline{w}(1-\lambda)(2\bar{w} - (2-\underline{w})\lambda)\tilde{\tau} + 2\bar{w}\underline{w}(1-\lambda)^2\tilde{\tau}^2 \\
&\propto -\lambda - 2\bar{w}\underline{w}(1-\lambda)\tilde{\tau} + \underline{w}(1-\lambda)(2-\underline{w})\lambda\tilde{\tau} + 2\bar{w}\underline{w}(1-\lambda)^2\tilde{\tau}^2 \\
&\propto -\lambda - 2\bar{w}\underline{w}(1-\lambda)\tilde{\tau}(1-(1-\lambda)\tilde{\tau}) + \underline{w}(1-\lambda)(2-\underline{w})\lambda\tilde{\tau} < 0 \\
\Rightarrow \quad & \frac{\partial g}{\partial \theta} > 0 \quad always.
\end{aligned}$$

Let us now consider $\tilde{\tau}$

$$\frac{\partial g}{\partial \tilde{\tau}} \propto (1-\underline{w})(1-\lambda)(\bar{w} + \underline{w}(\bar{w} + \underline{w}\lambda)) > 0 \quad always.$$

Let us now consider λ

$$\frac{\partial g}{\partial \lambda} \propto (1-\underline{w})\Big(1 - \underline{w}^2\tilde{\tau} - \bar{w}(2-\bar{w} - (1-\underline{w}-\bar{w})\tilde{\tau})\Big) > 0 \quad if\ and\ only\ if \quad \tilde{\tau} < \frac{1+\bar{w}^2-2\bar{w}}{\underline{w}^2 - \bar{w}(1-\underline{w}-\bar{w})}.$$

Substituting $\underline{w} = \frac{1}{1+\theta}$ we get

$$\tilde{\tau} < \frac{(1+\bar{w}^2-2\bar{w})(1+\theta)^2}{1+\bar{w}(1+\theta)\left(\bar{w} - (1-\bar{w})\theta\right)}.$$

■

Proof of Proposition 2

To prove the proposition, we examine how the ordering of thresholds w_P^*, w_C^* and w_P^{**}, w_C^{**} depends on the prescriptive norm $\tilde{\tau}$. Note that it is not possible to have $w_P^* > w_C^*$ and $w_C^{**} > w_P^{**}$ simultaneously, since the Catholic contribution decreases with w_i in the interval (w_C^*, w_C^{**}). Recall

the thresholds:

$$w_P^* = \frac{1}{(1+\theta)(1-\tilde{\tau})}, \qquad w_P^{**} = \frac{1}{1-\tilde{\tau}},$$

and

$$w_C^* = \frac{1}{1+\theta} + g^C, \qquad w_C^{**} = 1 + g^C,$$

where

$$g^C = \frac{1+\bar{w}^2-2\bar{w}}{2\left(\bar{w}-1+\underline{w}\right)}, \qquad \text{with} \qquad \underline{w} := \frac{1}{1+\theta}.$$

Substituting, we get:

$$w_C^* = \frac{1}{1+\theta} + \frac{1+\bar{w}^2-2\bar{w}}{2\left(\bar{w}-1+\frac{1}{1+\theta}\right)} \qquad w_C^{**} = 1 + \frac{1+\bar{w}^2-2\bar{w}}{2\left(\bar{w}-1+\frac{1}{1+\theta}\right)}$$

We now derive the conditions under which $w_C^* \geq w_P^*$. This holds if:

$$\begin{aligned} \frac{1}{1+\theta} + g^C \geq & \frac{1}{(1+\theta)(1-\tilde{\tau})} \\ \Rightarrow \ \tilde{\tau} \leq & 1 - \frac{1}{1+g^C(1+\theta)} \\ = & \frac{(1-\bar{w})^2(1+\theta)^2}{1+(\bar{w}-(1-\bar{w})\theta)^2} =: T_2. \end{aligned} \tag{24}$$

Similarly, $w_C^{**} \geq w_P^{**}$ if:

$$\begin{aligned} 1 + g^C \geq & \frac{1}{1-\tilde{\tau}} \\ \Rightarrow \ \tilde{\tau} \leq & 1 - \frac{1}{1+g^C} = \frac{(1-\bar{w})^2(1+\theta)}{1-\theta+\bar{w}^2(1+\theta)} =: T_1. \end{aligned} \tag{25}$$

Now, we show that $T_1 < T_2$:

$$\begin{aligned} T_1 < & T_2 \\ \frac{(1-\bar{w})^2(1+\theta)}{1-\theta+\bar{w}^2(1+\theta)} < & \frac{(1-\bar{w})^2(1+\theta)^2}{1+(\bar{w}-(1-\bar{w})\theta)^2} \\ \frac{1}{1-\theta+\bar{w}^2(1+\theta)} < & \frac{(1+\theta)}{1+(\bar{w}-(1-\bar{w})\theta)^2} \\ 1+(\bar{w}-(1-\bar{w})\theta)^2 < & (1+\theta)(1-\theta+\bar{w}^2(1+\theta)) \\ -2\bar{w}\theta+\theta^2-2\bar{w}\theta^2 < & -\theta^2 \\ -\bar{w}-\bar{w}\theta < & -\theta \quad \text{always true, since } \bar{w} \geq 1 \text{ and } \theta > 0 \end{aligned} \tag{26}$$

From (25), (24), and (26), we obtain the following conditions:

1. if $\tilde{\tau} \leq T_1$, then $w_P^* < w_C^*$ and $w_P^{**} \leq w_C^{**}$
2. if $T_1 < \tilde{\tau} < T_2$, then $w_P^* < w_C^* < w_C^{**} < w_P^{**}$
3. if $\tilde{\tau} \geq T_2$, then $w_C^* \leq w_P^*$ and $w_C^{**} < w_P^{**}$

In Case 2, the Catholic contribution intersects the Protestant contribution at the income level w_i satisfying:

$$\tilde{\tau} = \frac{g^C}{w_i} = \frac{1 + \bar{w}^2 - 2\bar{w}}{2w_i\left(\bar{w} - 1 + \frac{1}{1+\theta}\right)},$$

which implies:

$$\tilde{w} = \frac{1 + \bar{w}^2 - 2\bar{w}}{2\tilde{\tau}\left(\bar{w} - 1 + \frac{1}{1+\theta}\right)} = \frac{g^C}{\tilde{\tau}}.$$

Proof of Proposition 3

Recall that p and $1-p$ denote the share of Protestants and Catholics in the population, respectively, and that $g^{C,het}(p)$ denotes the average contributions of Catholics in a heterogeneous society as a function of p. Recall also that, in the case of homogeneous societies, the corresponding average contribution is and g^C, as defined in equation (10), and that the Protestants' average contribution is always g^P, defined by (7).

Catholic behavior depends on others' expectations and, thus, it depends on whether denominations are observable (or not) and on whether agents have perfect empathy (or not). Hence, we separately analyze four cases: (a) observable denominations and perfect empathy; (b) observable denominations and imperfect empathy; (c) not observable denominations and perfectly empathic agents; and (d) not observable denominations and imperfectly empathic agents.

(a) If denominations are observable and agents have perfect empathy, Catholics know that everyone (both Protestants and Catholics) expects Catholics to behave as such, i.e., $\bar{\mathbb{E}}_C^{het}(g_i) = g^C$. As a consequence, $g^{C,het}(p) = g^C$, which is independent of p.

(b) When denominations are observable and there is imperfect empathy, Catholics know that (i) a share p of individuals are Protestant, and expect g^P from everyone else (on average) (ii) a share $1-p$ of individuals are Catholic, and expect $g^{C,het}(p)$ from everyone. Catholics' best response is derived in the standard way, accounting for the fact that now the others' expectation on the average contribution is $g^{C,het}(p) = pg^P + (1-p)g^{C,het}(p)$. The Catholics' average contribution is therefore the solution to the following fixed-point problem:

$$\begin{aligned} g^{C,het}(p) = &\frac{1}{\bar{w}}\left[\int_{\frac{1}{1+\theta}}^{\frac{1}{1+\theta}+(pg^P+(1-p)g^{C,het}(p))}(w_i - \frac{1}{1+\theta})dw_i\right. \\ &\left. + \int_{\frac{1}{1+\theta}+(pg^P+(1-p)g^{C,het}(p))}^{1+(pg^P+(1-p)g^{C,het}(p))}(pg^P + (1-p)g^{C,het}(p))dw_i + \int_{1+(pg^P+(1-p)g^{C,het}(p))}^{\bar{w}}(w_i - 1)dw_i\right] \end{aligned} \tag{27}$$

Solving the integrals, we obtain:

$$\bar{w}g^{C,het}(p) = \left[\frac{w_i^2}{2} - \frac{w_i}{1+\theta}\right]_{\frac{1}{1+\theta}}^{\frac{1}{1+\theta}+(pg^P+(1-p)g^{C,het}(p))} + \left[(pg^P+(1-p)g^{C,het}(p))w_i\right]_{\frac{1}{1+\theta}+(pg^P+(1-p)g^{C,het}(p))}^{1+(pg^P+(1-p)g^{C,het}(p))} + \left[\frac{w_i^2}{2} - w_i\right]_{1+(pg^P+(1-p)g^{C,het}(p))}^{\bar{w}}$$

Let us denote $g^{C,het}(p)$ with x and let rewrite the previous equation as:

$$\begin{aligned}\bar{w}x =& \left[\frac{w_i^2}{2} - w_i\underline{w}\right]_{\underline{w}}^{\underline{w}+\left(pg^P+(1-p)x\right)} + \left[\left(pg^P+(1-p)x\right)w_i\right]_{\underline{w}+(pg^P+(1-p)x)}^{1+\left(pg^P+(1-p)x\right)} \\ &+ \left[\frac{w_i^2}{2} - w_i\right]_{1+(pg^P+(1-p)x)}^{\bar{w}} \\ =& \frac{\left(pg^P+(1-p)x\right)^2}{2} + \left(pg^P+(1-p)x\right)(1-\underline{w}) + \frac{\bar{w}^2}{2} - \bar{w} - \frac{\left(pg^P+(1-p)x\right)^2}{2} + \frac{1}{2} \\ =& \left(pg^P+(1-p)x\right)(1-\underline{w}) + \frac{(\bar{w}-1)^2}{2}\end{aligned}$$

Solving the fixed point equation we get

$$g^{C,het}(p) = \frac{pg^p(1-\underline{w}) + \frac{(\bar{w}-1)^2}{2}}{\bar{w}-(1-p)(\underline{w})}.$$

Since $g^C = \frac{(\bar{w}-1)^2}{2(\bar{w}-1+\underline{w})}$ we can write

$$g^{C,het}(p) = \frac{p(1-\underline{w})g^p + (\bar{w}-1+\underline{w})g^C}{p(1-\underline{w}) + (\bar{w}-1+\underline{w})}.$$

Thus defining $\phi(p) := \frac{p(1-\underline{w})}{p(1-\underline{w})+(\bar{w}-1+\underline{w})}$ we get

$$g^{C,het}(p) = \phi g^p + (1-\phi)g^C.$$

(*c*) Let us now consider the case in which denominations are not observable and agents are perfectly empathic. In the presence of perfect empathy, every individual expects that anyone picked at random is with probability p Protestant—with average contribution of g^P—and with probability $1-p$ Catholic—with average contribution $g^{C,het}(p)$. Therefore, the average contribution that anyone expects from a generic individual in society is the weighted average of the Protestant and the Catholic contributions. This average is also the contribution that a generic individual expects from a Catholic individual in society, and therefore, $g^{C,het}(p)$ is once again the solution to the fixed point problem described by eq. (27).

(*d*) Finally, let us consider the case in which denominations are not observable, and there is imperfect empathy. In this case, the average contribution of the society is an average of the contribution of Protestants and the contribution of Catholics. If in equilibrium Catholics think that everyone behaves as a Catholic, and they can observe the average contribution level, they will infer that $g^{C,het}(p) = pg^P + (1-p)g^{C,het}(p)$, i.e., it is equal to the average contribution level, and they will best respond to this perceived expectation on their behavior. Hence, once again, $g^{C,het}(p)$ is the solution to eq. (27).

■

Appendix Tables

TABLE A.1: Estimates with balanced panels

Dependent variable:	Voluntary Donations	
	T=3	
	2010-15-18	2015-18-20
	(1)	(2)
Income	78.119**	56.527**
	(38.840)	(27.015)
Income×Cath	-83.492*	-27.392
	(49.261)	(22.814)
Taxes	-68.201	-51.160
	(68.971)	(57.555)
Controls	Yes	Yes
Individual FE	Yes	Yes
State-by-survey-year FE	Yes	Yes
Observations	4844	5650
Number of individuals	2025	2036
R-squared	0.85	0.84

Note: OLS estimates with robust standard errors clustered at the individual level. The dependent variable is the amount (in Euros) of voluntary donations. All the models include individual fixed effects, state-by-survey-year fixed effects, and controls for age, marital, occupational, and health status. Taxes, computed as difference between gross and net self-reported income, are also included. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

TABLE A.2: Parents' religious denomination

Dependent variable:	Voluntary Donations					
	Baseline sample			Extended sample		
	Mother	Father	Mother & Father	Mother	Father	Mother & Father
	(1)	(2)	(3)	(4)	(5)	(6)
Income	39.087***	38.622***	39.763***	29.904***	29.808***	29.013***
	(11.925)	(12.500)	(12.265)	(8.344)	(8.291)	(8.292)
Income×Cath	-27.591			-23.665*		
	(21.677)			(14.209)		
Income×Cath		-29.965			-27.983*	
		(22.396)			(15.625)	
Income×Cath			-37.750			-27.833*
			(24.064)			(16.132)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
State-by-survey-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11627	11627	11627	15461	15461	15461
Number of individuals	4533	4533	4533	6097	6097	6097
R-squared	0.72	0.72	0.72	0.71	0.71	0.71

Note: OLS estimates with robust standard errors. The dependent variable is the amount (in Euros) of voluntary donations. In columns 1–3 the sample contains individuals reporting a religious affiliation. In columns 4–6 we include also individuals with no-religious affiliation. All the models include individual-fixed effects, state-by-survey-year fixed effects, and fixed effects for age, marital, occupational, and health status. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

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