

# PERSONAL LIBERTIES, RELIGIOSITY, AND EFFORT<sup>1</sup>

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## ABSTRACT

In this paper we study the role of religiosity in influencing the choice of labor effort. Many religions promote restrictions on personal liberties such as divorce, abortion, gender parity, or gay marriage. We assume that the higher the degree of religiosity of an individual the less he enjoys such personal liberties, and moreover the less he likes to be in a society which allows such liberties. The model implies that under some simple conditions, individual labor supply is decreasing in the level of religiosity and that this negative relationship is enhanced by the width of liberties. We show empirically that this holds and that the size of the effect is large. Specifically, we construct an index of personal liberties and find solid evidence in support of the *joint* effect of religiosity and liberties on labor effort. Our empirical results indicate that negative externalities experienced by religious individuals when society allows for or practices such personal liberties are an important part of the effect of liberties on their economic choices.

JEL-Classification: Z12, J22

Key-words: Religiosity, Personal Liberties, Labor supply.

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# 1 Introduction

Religion shapes individual preferences, “men’s involuntary beliefs, feelings and desires” (John Stuart Mill, *Utility of Religion*, 1874), as in Guiso et al (2006) or Benabou et al. (2015). Indeed all religions define a set of norms of behavior that affect the choices of their affiliates and that have been instilled through education and family transmission of values. These norms include rules on how to dress, what to eat, what to drink, how to spend one’s time, as well as the condemnation of some actions like *divorce, abortion, gender parity, homosexual behaviour or euthanasia*. The boundaries over such kind of personal liberties have typically been set by laws that restrict the behaviour of both religious and non-religious individuals. Over the past fifty years however many governments have changed such laws (see a quantitative measure of this process of liberalization in Section 3.1.2): Women’s rights for education or employment and the right over their bodies had expanded, along with gay rights and individuals’ rights over ending their life. This has affected some of the choices of the non-religious, while religious individuals have continued to be bound by their stricter norms.

In this paper we examine the effect of religious attitudes towards such personal liberties on economic choices. Our empirical results show that the relaxation of legal constraints has a differential impact on economic choices, specifically, on labor supply. We observe that while expanded personal liberties provide an incentive for seculars to supply more labor, they provide a *disincentive* for the religious.

The evidence that lifting restrictions on personal liberties can adversely affect the labour supply of those with a distaste for such liberties is strongly indicative of the presence of *negative externalities*. The great increase over the last decades of gender parity or LGBT rights does not force religious communities and individuals to exercise such rights. They are free not to use them. Providing lower labor supply when such rights are abundant attests that religious and conservative individuals also dislike to live in a society which allows such liberties or practices them. This is in line with the numerous political protests around the world against the relaxation of restrictions on such personal liberties, and sometimes violent conduct against individuals who practice them.<sup>3</sup>

We provide a simple theoretical framework to introduce the effect of personal liberties

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<sup>3</sup>See Abramowitz (1995), Campbell and Monson (2007) and Layman (1997,2001) on how these issues have become a deep cleavage in the political debate.

on economic choices. As in Iannaccone (1992), Benabou and Tirole (2006), and Benabou et al. (2015), we assume that religiosity affects the preferences of individuals. Specifically, it affects their attitude towards the “consumption” of liberties. While religions may directly affect individuals’ ability to work (by having to spend time on religious rituals, or by restricting women’s choices), the presence of negative externalities indicates that it may be better to incorporate attitudes to liberties in one’s preferences. Thus, to a standard two-good model of individual choice on consumption and effort, we add a third (public) good, personal liberties. How much of these liberties can be used is established by law. In addition to their earning capacity, individuals are endowed with a given degree of religiosity. We assume that the stronger the degree of religiosity the deeper is the commitment to the religious norm and hence the distaste for liberties.

We characterise a simple condition under which, for a fixed maximum level of individual liberties allowed by law, labor supply is decreasing in religiosity and this gap increases with the width of liberties. Moreover, in the presence of externalities, the widening of liberties increases the labor effort by the secular and, in the presence of externalities, decreases that of the religious.

We test empirically the prediction that religiosity interacted with liberties is a key factor explaining labor supply. The results are in line with the theory, statistically significant and the size of the effect is large. An increase of one standard deviation in the intensity of religious beliefs is associated with a decrease in the number of hours worked per week of 1.8 hours for individuals who live in a society with high level of allowed liberties.

To test our predictions we construct an index of personal liberties by country based on the legal evolution of certain individual liberties from 1960 to 2013 that are or have been controversial in the recent past. The data reflects legislation on abortion, divorce, women’s rights, LGBT rights and euthanasia, and is assembled from various sources such as the UN, the EU parliament, World Bank, the Human Rights project, Pew Research Center, Freedom to Marry, etc. We use a lagged index taking into consideration that individuals’ important choices in life such as education and family-related decisions are taken relatively early in life and are difficult to reverse.

The individual level data on religiosity and other individual controls are derived from the European Social Survey (ESS), where we use data from 6 waves (2002, 2004, 2006, 2008, 2010 and 2012) and 34 European countries. We regress the individual (and the desired) number of hours worked on individual measures of religious affiliation and religious intensity, their interac-

tion with the index of liberties, as well as standard individual controls. To tackle endogeneity, as some unobservable traits may affect both religious intensity and labor outputs, we construct an instrument for religious intensity. Specifically, as religiosity is a cultural trait shared by people over and above national borders, our instrument for religious intensity is derived by computing the average religious intensity of people of the same sex, age bracket and religious denomination that live in neighbouring countries. We also conduct many robustness checks, as well as provide empirical support for the mechanism suggested in the theoretical section.

This paper falls under the recent literature exploring the effect of culture on economic outcomes.<sup>4</sup> While the rejection of personal liberties is associated with more general conservative ideology, it is deeply rooted in religious prescriptions, and we therefore choose to focus on religion as the cultural trait.

The result that religiosity is associated with lower effort or labor supply has been attested by abundant empirical literature. Clark and Lelkes (2005), Berman (2000), Lehrer (1995), among others, find that religiosity has a negative effect on labor supply. At the aggregate level Barro and McCleary (2003) show that economic growth is negatively related to church attendance, but positively to religious beliefs in heaven and hell. Campante and Yanagizawa-Drott (2013) show that longer Ramadan fasting has a negative effect on Muslims' relative preferences for work and as a result on output growth in Muslim countries.<sup>5</sup> What we show in this paper, and add to this literature, is that the interaction of religiosity with the availability of personal liberties is a key factor in explaining the different labor supply decisions of the religious and the secular, and that the religious suffer from negative externalities when such liberties are practiced or allowed.

There have been other explanations in the literature on the channels through which different religions could influence output. On this respect, Carvalho and Koyama (2012) illustrate how religions choose their cultural restrictions strategically to induce labor and capital contributions in the face of exogenous changes to economic development. Benabou, Ticchi and Vindigni

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<sup>4</sup>See for example Fernandez and Fogli (2009) and Fernandez et al. (2004) who obtain that economic choices for second generation immigrants can be explained by the culture of their country of ancestry. Guiso, Sapienza and Zingales (2003, 2006) find that christian religions facilitate growth and that culture has a strong influence in economic performance. Becker and Woessman (2009) show how the Protestant religion had induced a higher level of education. Alesina, Giuliano and Nunn (2013) find that descendants of societies that traditionally practiced plough agriculture have less equal gender norms today, while Alesina and Giuliano (2015) review the relationship between culture and institutions.

<sup>5</sup>This suggests, in line with our paper, that changing beliefs and values can influence labor supply and occupational choices beyond the month of Ramadan itself.

(2013, 2015) look at how religious censorship might affect innovation and scientific progress and hence total output. Benabou and Tirole (2006) argue that religions may affect differently belief manipulation and hence effort.

Below we start with the description of a simple model that allows individuals to differ in their preferences for personal liberties, and derive its implications for labor supply. Section 3 deals with the data and the empirical strategy and Section 4 provides the main empirical results. Section 5 directly tests the empirical backing for our assumptions. Section 6 discusses possible alternative explanations of our results. One simple alternative model is to consider religion as directly blocking the labor supply of individuals. As our results are stronger for women (which also is the group most affected by the type of personal liberties we are considering), such a model could also fit the data. While such mechanism is clearly complementary, the fact that religious individuals *reduce* their labor supply in response to an increase of liberties in society attests that there is more at play -e.g., externalities in preferences- than pure constraints. We conclude in Section 7.

## 2 Religiosity and labor supply

Religion can affect the standard economic problem of utility maximization by affecting individuals' preferences (as in Azzi and Ehrenberg 1975 and Iannaccone 1992), beliefs (as in Levy and Razin 2012, Benabou and Tirole 2006), or the constraints they are facing (as in Carvalho and Koyama 2015). In this paper we incorporate the attitudes of religious individuals towards exercising personal liberties. In the model we will interpret this as affecting the preferences of such individuals when "consuming" such liberties. We discuss in Section 6 other modelling possibilities. In general there is no substantial difference, from a modelling point of view, whether such attitudes are incorporated in the preferences or as some moral constraints the individuals are facing. The data indicates however that negative externalities play an important role, which we find more natural to model via preferences.

There are three goods which individuals can potentially enjoy: two are private goods, consumption  $c$  and leisure  $l \in [0, 1]$ . To obtain consumption individuals need to exert effort which is defined as  $e = 1 - l$ . There is also a public good, personal liberties  $\ell \in [0, \ell_M]$ . The maximum liberties accessible  $\ell_M$  is determined by law. We assume that there are no constraints on the free

practice of personal liberties within  $[0, \ell_M]$ . Modelling liberties as a costly good does not affect the results.

The legal cap on liberties has two effects. First, it establishes the limit to what is accessible to individuals. Second, it may produce an externality because individuals may dislike to be in a society where some liberties are permitted, independently of whether or not they will personally use them. We represent the effect of liberties on an individual as the combination of the personal use of them,  $\ell$ , and the maximum legally permitted,  $\ell_M$ , this being multiplied by the parameter  $\alpha \in [0, 1]$ . This parameter indicates the weight assigned to the externality effect and can differ for religious and secular. Our analysis is robust to the externality arising instead from the actual practice of wider liberties by some individuals in society.

Individuals are endowed with a “religiosity” index  $x \in [0, 1]$ . We parametrise the difference in the individual preferences over liberties by assuming that the utility function over consumption, liberties, and leisure, can be written as

$$u\left(c, (\bar{x} - x)[\ell + \alpha\ell_M], 1 - e\right), \quad (1)$$

where  $u(\cdot, \cdot, \cdot)$  is common to all individuals and  $\bar{x}$  is the threshold level of religiosity separating those that value liberties positively with  $x \leq \bar{x}$  (we call them *secular*) from those that value them negatively, with  $x > \bar{x}$  (the *religious*).<sup>6</sup> Notice that the higher the degree of religiosity the lower the valuation of liberties. In addition, as we have already mentioned, we allow religious and secular to also differ in the importance attached to the externality effect of the legal cap,  $(\alpha_R, \alpha_S)$ .<sup>7</sup>

We assume the standard properties on  $u(\cdot, \cdot, \cdot)$ : the utility function increases in all arguments, satisfies concavity with respect to each argument, and has non-negative cross derivatives. Notice that these properties together with the adopted representation of preferences imply that the marginal utility of liberties can be positive or negative, depending on whether the individual is secular or religious.

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<sup>6</sup>We are taking the liberty of denoting as “secular” the individuals with  $x \leq \bar{x}$  and “religious” the ones with  $x > \bar{x}$ . In the empirical section of the paper we indeed find that religiosity is highly significant in explaining attitudes towards individual liberties.

<sup>7</sup>One can as well interpret  $x$  as the level of conservatism of an individual. The correlation between religiosity and conservative attitudes has already been shown by Andersen and Fetner (2008), De La O and Rodden (2008), Inglehart and Baker (2000), and Kirkpatrick (1993). In the empirical part of this paper we consider this possible alternative interpretation of the results and use direct measures of conservatism rather than of religiosity. Both variables are indeed highly correlated, but in a horse race we obtain that religiosity explains the evidence better.

Let us start with the choice of individual liberties  $\ell \in [0, \ell_M]$ . Since liberties are a free (public) good, it is immediate that the optimal individual choice will consist of selecting either  $\ell = \ell_M$  if  $x \leq \bar{x}$  or  $\ell = 0$  if  $x > \bar{x}$ . Therefore, the individual liberties component will be either  $(1 + \alpha_S)\ell_M$  for secular individuals or  $\alpha_R\ell_M$  for religious individuals. Given this, and in order to simplify on notation, we will from now on use  $\ell$  for the legal cap  $\ell_M$ .

Taking this choice into account we write  $u(c, \Lambda_i, 1 - e)$ ,  $i = S, R$ , where  $\Lambda_S = (\bar{x} - x)(1 + \alpha_S)\ell$  and  $\Lambda_R = (\bar{x} - x)\alpha_R\ell$  are the interaction of religiosity with the personal liberties component. Recall that the  $u$  function is common to all and that  $\Lambda_S > \Lambda_R$ . Hence, if cross derivatives of  $u$  are positive, religious individuals will have a lower marginal utility of consumption and of leisure, all equal.

Besides their level of religiosity, individuals are also characterised by their earning capacity  $w$ . Earned income  $we$  is entirely consumed, so that  $c = we$ . Plugging the budget equality in the utility function we have

$$u(we, \Lambda_i, 1 - e), \quad i = S, R,$$

so that given the unconditioned choice of liberties by each individual, utility depends on the choice of  $e$  only. It can be readily checked that utility is strictly concave in  $e$  and hence the optimal choice can be obtained from the first order condition:

$$\frac{du}{de} = wu_c(we, \Lambda_i, 1 - e) - u_l(we, \Lambda_i, 1 - e) = 0, \quad i = S, R.$$

Given the above, we can now examine the relationship between labor supply  $e$  and religiosity  $x$ . Totally differentiating the first order condition with respect to  $e$  and with respect to  $x$  we have

$$\frac{de}{dx} = -\frac{\frac{d^2u}{ded\Lambda_i}}{\frac{d^2u}{de^2}} \frac{d\Lambda_i}{dx}.$$

As  $\frac{d^2u}{de^2} = u_{ll} < 0$ , the denominator is negative. Moreover, we know that  $\frac{d\Lambda_i}{dx} < 0$ . As for the term in the numerator, we can easily obtain that

$$\frac{d^2u_i}{ded\Lambda_i} = u_l \left[ \frac{u_{c\Lambda}}{u_c} - \frac{u_{l\Lambda}}{u_l} \right].$$

Therefore the sign of  $\frac{de}{dx}$  is given by the difference between two non-negative terms (that can be interpreted as monotonic transformations of elasticities) and it depends on which is largest. An increase in religiosity  $x$  decreases the marginal utility of consumption –and this induces less effort– but it also decreases the marginal utility of leisure –which induces more effort. The net result from the two effects depends on which term is largest and this is an empirical matter.<sup>8</sup> Our results support the assumption that there are no complementarities between leisure and religiosity, and we therefore present the proposition for this case:

**Proposition 1** *Let  $\frac{u_{c\Lambda}}{u_c} > \frac{u_{l\Lambda}}{u_l}$ . The effects of religiosity and liberties on labor supply are as follows:*

*[i] Labor supply depends on the interaction of religiosity and liberties  $\Lambda_i$  and is strictly decreasing in religiosity  $x$ .*

*[ii] An increase in the legal cap on liberties  $\ell$ , increases (decreases) the effort of secular (religious) individuals.*

Our model provides an explicit theoretical basis for the negative relationship between religiosity and individual effort that has already been identified by a number of empirical papers.<sup>9</sup> The model delivers the new, testable implication that this effect is enhanced by the legal level of individual liberties. This result is supported by our own empirical analysis presented in the rest of the paper. We will also provide direct evidence to validate the assumptions -and premise- behind Proposition 1 (see Section 5).

### 3 Empirical Analysis

We now explore empirically the implications of the theory. In this section we introduce the data, the variables employed in the empirical analysis, our specific testable hypotheses, as well as our empirical strategy. The main results of the empirical analysis are presented in Section 4.

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<sup>8</sup>Note that religious and secular individuals differ substantially in how they spend their leisure, and religions often prescribe very specific ways in which leisure time should be spent (e.g., performing rituals, reading the Bible, not working on the Sabbath, etc.). As a result, it is not obvious what is the right assumption in terms of the marginal utility of leisure as a function of liberties and the degree of religiosity.

<sup>9</sup>Besides the empirical findings by Clark and Lelkes (2005), Lehrer (1995), and Campante and Yanagizawa-Drott (2013), already mentioned above, there is other complementary empirical evidence. Darnell and Sherkat (1997) document a strong negative effect of fundamentalism on educational achievement, controlling for other social background variables. Dilmaghani (2012) finds that the level of religiosity [across faiths] is highly significant and with a negative coefficient in explaining hourly wage.



## 3.1 Data and variables

### 3.1.1 Individual-level data

We use individual-level data from the European Social Surveys (ESS). We consider all rounds (2002, 2004, 2006, 2008, 2010 and 2012) and all countries available (at most 34). The surveys focus on European countries and also including Turkey and Israel.<sup>10</sup> This results in a large raw dataset of more than 200,000 observations. We have dropped from the sample full-time students, retired people and individuals with permanent disabilities. In addition, we've also dropped people being born abroad as they can have been exposed to a different legislation on liberties. In what follows we describe how we have used the information of the ESS to obtain proxies for our variables of interest. Detailed definitions as well as tables of summary statistics are provided in Appendix A.

**Religiosity.** We construct measures of religious *affiliation* and religious *intensity*.  $REL_{AFF}$  is a dummy that measures current religious affiliation while  $REL_{EVER}$  is equal to 1 if the respondent currently belongs or has belonged in the past to a religion. The correlation between these two variables is, not surprisingly, very high (.82) as only 8% of the people in our sample declare not to belong to a religion but to have belonged in the past.<sup>11</sup>

Three variables in the ESS capture different dimensions of religious intensity.  $PRAY$  measures respondent's monthly frequency of praying,  $RELIGIOSITY$  is self-reported degree of religiosity, and  $RELIGIOUS\ ATTENDANCE$  reports respondent's monthly frequency of attendance to religious services. All variables have been renormalized so that they are all measured on a scale from 0 to 1. We construct an index of individual religiosity,  $REL_{INT}$ , by computing the simple average of the above-mentioned variables. Using principal components instead of a simple average delivers virtually identical results.

**Effort.** Our main dependent variable is the total amount of hours worked per week (in main job), including any paid or unpaid overtime ( $HOURSWORKED$ ). In the robustness checks section, we also look at alternative variables such as the number of contracted hours per week in main job, excluding

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<sup>10</sup>The countries in the sample are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.

<sup>11</sup>Among the 281,297 respondents of the ESS, 23,691 have changed their religious affiliation.

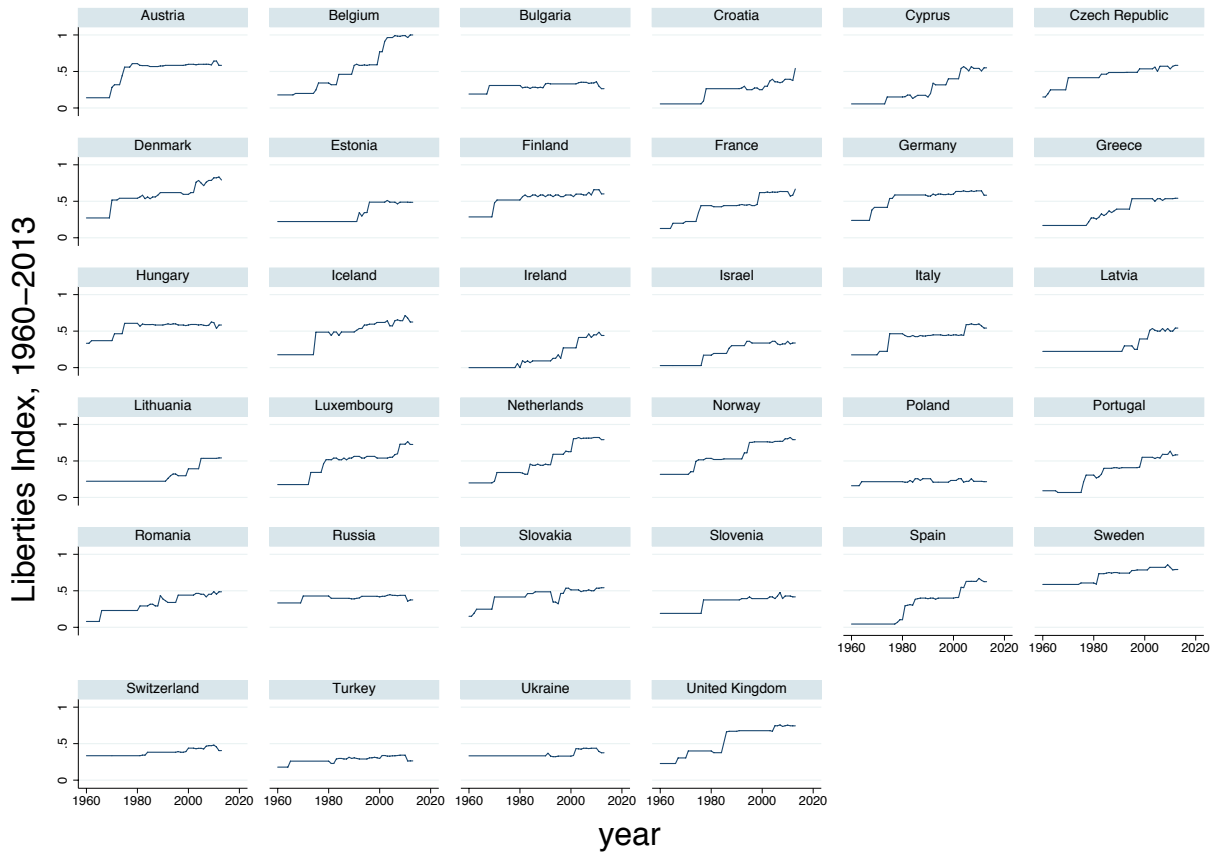


Figure 1: Legal evolution of the Personal Liberties index, 1960-2013

overtime (CONTRACTHOURS). Notice, however, that both HOURSWORKED and CONTRACTHOURS are imperfect measures of the willingness to work, as they reflect *attitudes* towards effort *as well as* the characteristics of the environment (i.e., rigidity of the labor market). To address this issue, we also consider a variable that reports the number of hours that the respondent would like to work (DESIREDHOURS). Unfortunately, this variable is only contained in two of the rounds of the ESS so the sample size reduces considerably.

**Individual controls.** We use a list of standard controls: age (AGE) and age squared (AGE<sup>2</sup>), gender (GENDER), whether the respondent lives with a partner (COHAB), years of completed education (EDUYRS), a subjective measure of own's health (HEALTH), whether there are children in the household (CHILDREN), the size of the household (HHSIZE) and a measure of partner's education (EDU-PTNR).

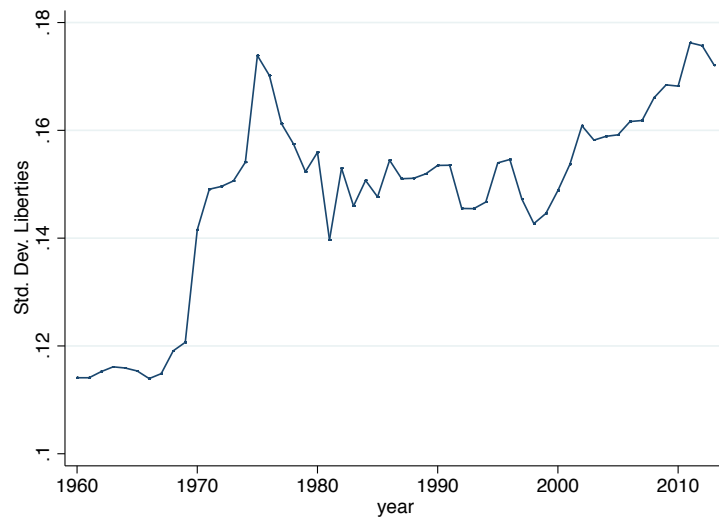


Figure 2: Cross-country std. deviation of the Personal Liberties index, 1960-2013

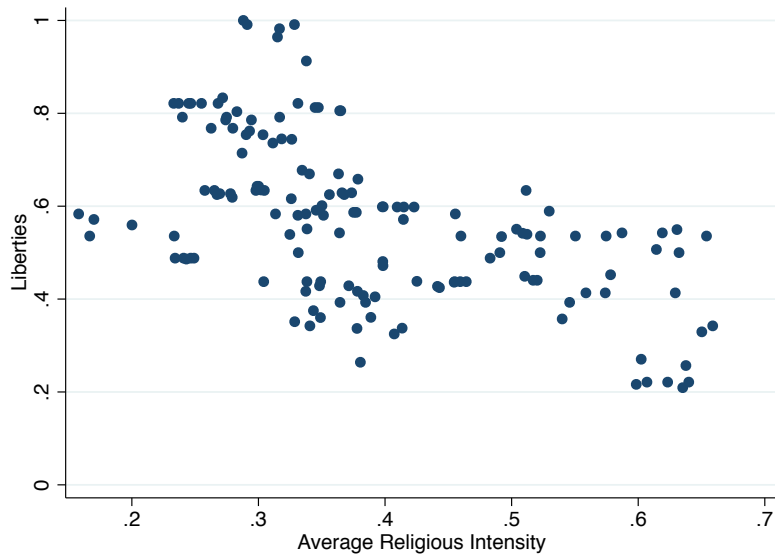


Figure 3: Personal Liberties index versus average religious intensity

### 3.1.2 Personal Liberties

We have collected data on the evolution of the legislation on abortion, divorce, women's rights, LGBT rights, and euthanasia from 1960 to 2013 for each of the countries in our dataset. All these issues are (or have been) controversial over this period. Data come from a number of sources such as the UN, the EU parliament, World Bank, Human Rights project, Pew Research Center, Freedom to Marry, etc. To elaborate the liberties index we proceed as follows. We first create an index for each individual issue and country at each point in time. To do that, we look at a number of dimensions. For instance, to elaborate the LGBT rights index we have coded for each year from 1960 to 2013 whether it is legal to maintain a sexual relationship with someone of the same sex, whether a same-sex union and/or marriage is legal and whether same-sex parents are allowed to adopt. We then calculate our index of liberties as the simple average of the individual indices. See Appendix A.2 for additional details on its construction.

Figure 1 displays the evolution of the index of liberties in Europe from 1960 to the present while Figure 2 depicts its cross-country standard deviation for each of the years of the 1960-2013 period. Despite the fact that we focus exclusively on European countries, both figures reveal substantial variability both over time and across countries. The most conservative countries according to our index are Ireland (with an average value of the index of .15 across the period), Israel (.20) and Poland (.21). On the other side of the spectrum, the most liberal countries are Sweden at the top (.70 on average), followed by Norway and Denmark (.56). As for temporal evolution, the value of the index was relatively low and homogeneous across European states during the 60's. The 70's witnessed an important increase in the variability of the index, reflecting the legal changes occurring in some, but not all, of the countries in the dataset. During the 80's and 90's most of the countries in the sample kept introducing legal reforms so the variability of the index decreased as countries started to catch up. A new liberalisation wave in the 2000's has led the variability of the index to a new maximum.

Finally, Figure 3 displays the value of the Liberties index versus average religious intensity by country and survey wave (i.e., there are 6 time points for each country). The graph shows that, not surprisingly, there is a strong negative correlation between religiosity and liberties (the correlation is equal to -0.56).

## Operationalising the Liberties index

The next step is to construct a variable that summarizes individual access to liberties. To construct an individual-specific index we exploit the following idea. Many education, work and family-related decisions are taken early in life and are difficult to overturn later on. For instance, a woman's decision on education and fertility is typically taken when she is in her 20's and 30's. This decision is difficult to overturn if the legal context affecting female participation in the labor market changes substantially 20 years later. Thus, as family and education decisions are taken early in life and are extremely persistent, we should expect that individuals are more responsive to the level of afforded liberties at the time when these decisions are made.

To implement this idea, we construct individual-specific indicators that reflect the level of liberties at different stages of the individual's life cycle. To that effect, we average the values of the liberties index corresponding to the years when that individual was between 18 and  $G$  years of age, with  $G = \{40, 50 \text{ and } 60\}$ . We label the resulting index as  $LIB_G$ . In our baseline analysis we use  $LIB_{40}$ , and show that results are robust to using the other  $G$  as well.<sup>12</sup>

### 3.2 Empirical strategy

Estimating the economic impact of cultural factors is, in general, a difficult task and empirical work is often plagued by identification problems, see Guiso et al. (2003, 2006) for a summary of the main challenges faced by this literature. Some of these problems include the difficulty of controlling for all the relevant variables (which leads to omitted variable bias), the fact that causality is likely to work both ways –from culture to economics and from economics to culture–, and the fact that most studies focus on the relation between religiosity and economic *outcomes*, not *attitudes*.<sup>13</sup> To overcome these problems, our empirical strategy is constructed around the following points.

First, we control for country, survey and country-survey fixed effects in all our specifications. Introducing country-survey dummies allows us to eliminate the impact of institutional variables and reduce in this way the risk of omitted variable bias. The drawback of this approach is that, as religiosity is at the very core of the nation's culture in many instances, these dummies can partially absorb the impact of religion. Thus, our estimates can be interpreted as a lower bound of the effect

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<sup>12</sup>We have also checked  $G = 30$  and the results are robust.

<sup>13</sup>Outcomes are the result of attitudes but also of the surrounding institutional and individual environment.

of religiosity on effort.

Second, we follow two approaches to overcome the potential endogeneity of religious beliefs. The first one introduces a new instrument for religious intensity, see Section 3.3 below for a detailed explanation. We examine extensively the validity of our IV strategy, including robustness checks to the violation of the exclusion restriction (see Appendix B.3). The second approach consists of focusing on dimensions of religiosity that are inherited by an individual from previous generations, rather than voluntarily accumulated, such as religious affiliation (Guiso et al., 2006). Religious affiliation is largely inherited and this tends to mitigate reverse causality concerns. As mentioned earlier, only around 8% of the respondents in the ESS sample have changed their religious affiliation over their lifetime.

Third, we consider two types of dependent variables: the *effective* number of hours worked and the *desired* number of hours worked. The first one is an economic *outcome* and reflects both the willingness to work as well as country-specific labor market characteristics and personal constraints. The second variable reflects individual *attitudes* towards effort and it allows to identify in a cleaner way the effect of religious beliefs on people's preferences as it is less constrained by individual and country characteristics.

Fourth, we also examine empirically the *channels* linking religiosity and effort. Religions preach the condemnation and stigma of the use of various liberties shaping individual preferences on these issues. Our theory stresses the complementarity between consumption and liberties, which makes religious people to have lower (net) marginal utility of consumption and thus, less incentives to work. In our empirical exercise we will directly explore whether religious individuals: 1) dislike liberties; 2) value an increase in consumption (or in leisure) less than seculars with a gap that increases with the amount of liberties afforded.

### **3.3 Instrumenting religious intensity**

As mentioned earlier, the intensity of religious beliefs is likely to be endogenous. Religious *intensity* is voluntarily accumulated by individuals rather than “inherited”, as is the case of religious affiliation. Thus, variables that shape both intensity and effort, but that are not included in the regression, would lead to endogeneity of religious beliefs. Since we control for country-survey fixed

effects, the risk of institutional-level omitted variables is small. This is not the case, however, when considering individual-level characteristics. We control for a number of these characteristics (see 3.1.1). However, unobserved individual traits are a concern. The theoretical model presented in the previous section highlights the importance of a variable that we don't observe: the potential wage,  $w$ . The higher  $w$ , the higher the effort. The potential wage is likely to depend on many factors, but mostly on education (that we observe) and on some measure of *productivity* or innate *ability* (that we don't observe). It follows that if *ability* and the intensity of religious beliefs are correlated, then the latter would be endogeneous.

In the following we describe our instrument, which has been designed with this concern in mind. To construct an instrument for  $REL_{INT}$ , we exploit the fact that religiosity is a cultural trait that transcends national borders. That is, people belonging to a particular religious denomination share an important part of their culture with people of the same denomination living in other countries (but do not share the same institutional environment). In particular, they are likely to have similar beliefs and attitudes towards topics regulated by their religions. We construct an instrument for  $REL_{INT}$ ,  $REL_{INT}^{IV}$ , as follows: for an individual  $i$  from country  $j$  with (current or past) religious denomination  $r$ , we consider the people of the same religious denomination, gender and age bracket living in the countries that share a border with country  $j$ .<sup>14</sup> We consider neighbouring countries so that similarities between national customs are more pronounced. Next, we compute the average value of  $REL_{INT}$  for those individuals. The resulting quantity is the value of  $REL_{INT}^{IV}$  for individual  $i$  in country  $j$ .

As the instrument is the average of other people's religiosity, by construction it is uncorrelated with individual  $i$ 's "*innate*" characteristics, such as ability.

As in any IV analysis, however, we cannot entirely exclude the possibility that our instrument violates the exclusion restriction. This would be the case, for instance, if religious affiliation is transmitted from parents to children (through education or genes) along with other factors that have a direct impact on ability. Appendix B.3 examines the robustness of our empirical results to violations of the exclusion restriction and shows that our conclusions are quite robust to deviations from this hypothesis.

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<sup>14</sup>We define three age brackets: from 18 to 35, from 36 to 60 and from 60 onwards. Results are robust to changes in the definition of the brackets.

### 3.4 Empirical specification and hypotheses

Our main goal is to test the implications of Proposition 1, namely, that labor supply depends on the interaction between religiosity and liberties and that liberties increase effort for seculars but decrease it for religious. It seems natural to use a linear specification to test these claims. In Appendix B.1 we provide an example of a utility function that generates this type of relationship among the key variables of interest.

We estimate the following equation:

$$e_{i,j,s} = \beta_0 + \beta_1 Rel_{i,j,s} + \beta_2 Rel_{i,j,s} \times \ell_{i,j,s} + \beta_3 \ell_{i,j,s} + X'_{i,j,s} \beta + \gamma Z_j + \delta Y_s + \mu Z_j \times Y_s + \epsilon_{i,j,s}, \quad (2)$$

where  $i$  and  $j$  and  $s$  denote individual, country and survey year, respectively,  $Rel$  is a proxy of individual religiosity ( $x$ ),  $\ell$  is the individual-specific index of liberties ( $LIB_G$ ),  $X$  contains individual controls, and  $Z$  and  $Y$  are country and survey dummies, respectively.

Differentiating this equation with respect to  $\ell$  and  $Rel$ , we obtain

$$\partial e_{i,j,s} / \partial \ell_{i,j,s} = \beta_3 + \beta_2 Rel_{i,j,s} \quad (3)$$

$$\partial e_{i,j,s} / \partial Rel_{i,j,s} = \beta_1 + \beta_2 \ell_{i,j,s} \quad (4)$$

Our theory implies that  $\beta_2 < 0$  and  $\beta_3 > 0$ , that is, the marginal impact of an increase in the cap on liberties  $\ell$  on effort is positive for low levels of religiosity but it becomes negative when religiosity is high. The turning point of this equation allows us to identify  $\bar{x}$ , the threshold separating religious and seculars, which is given by  $\bar{x} = -\beta_3/\beta_2$ . We'll use the estimated coefficients to identify the value of  $\bar{x}$ . A final implication of our theory is that for positive levels of liberties expression (4) is smaller than zero, that is, the marginal effect of religiosity on effort is overall negative.



	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
REL <sub>INT</sub>	-0.551 (0.185)	3.355*** (0.007)	3.794*** (0.004)	3.385*** (0.002)	-0.904 (0.398)	6.820** (0.013)	7.089** (0.014)	5.690** (0.019)
LIB <sub>40</sub>	0.220 (0.887)	3.189** (0.036)	3.414** (0.030)	2.066 (0.268)	0.450 (0.767)	5.752*** (0.004)	5.788*** (0.005)	3.740* (0.071)
REL <sub>INT</sub> × LIB <sub>40</sub>		-8.669*** (0.002)	-9.226*** (0.002)	-8.171*** (0.000)		-16.451** (0.011)	-16.929** (0.013)	-13.191** (0.014)
AGE <sup>2</sup>	-0.001 (0.299)	-0.001 (0.165)	-0.002** (0.027)	-0.002*** (0.003)	-0.001 (0.402)	-0.001 (0.129)	-0.002** (0.021)	-0.002*** (0.002)
AGE	0.063 (0.377)	0.082 (0.230)	0.131* (0.050)	0.184*** (0.003)	0.051 (0.487)	0.089 (0.196)	0.131** (0.046)	0.181*** (0.002)
GENDER	-7.666*** (0.000)	-7.676*** (0.000)	-7.677*** (0.000)	-6.819*** (0.000)	-7.586*** (0.000)	-7.633*** (0.000)	-7.620*** (0.000)	-6.781*** (0.000)
CHILDREN			-0.555** (0.030)	-0.170 (0.374)			-0.720*** (0.002)	-0.237 (0.215)
EDUYRS			0.067 (0.230)	0.061 (0.262)			0.102* (0.060)	0.096* (0.064)
HHSIZE			-0.063 (0.568)	-0.239*** (0.003)			0.033 (0.716)	-0.211*** (0.008)
HEALTH			-0.019 (0.852)	-0.107 (0.241)			-0.010 (0.926)	-0.104 (0.271)
EDU-PTNR			-0.060 (0.258)				-0.035 (0.470)	
COHABIT				-0.230 (0.114)				-0.152 (0.274)
c	43.009*** (0.000)	41.219*** (0.000)	43.688*** (0.000)	39.795*** (0.000)	51.861*** (0.000)	47.708*** (0.000)	45.907*** (0.000)	53.360*** (0.000)
R <sup>2</sup>	0.148	0.149	0.150	0.129	0.149	0.150	0.151	0.129
Obs	98200	98200	96448	142617	91055	91055	89418	132297
K-P test					499	272	270	313
Cragg-Donald					22815	15942	10687	16284
AR test					0.4052	0.028	0.031	0.033

Table 1: BASELINE: EFFORT, RELIGIOUS INTENSITY AND LIBERTIES, OLS AND 2SLS

Notes. Dependent variable is HOURSWORKED. All models contain country, survey and country-survey dummies. Columns 1-4 have been estimated by OLS while columns 5-8 by 2SLS. There are 34 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

## 4 Results

### 4.1 Baseline

This section presents our results relating effort, religiosity and liberties. We focus mostly on people that cohabit (which are around 70% of the sample) as the type of liberties used in the elaboration of the liberties index affect this group more. We show, however, that our conclusions are also valid when the whole population is considered. Table 1 contains our baseline results. For the sake of brevity, the explanations below focus on our key variables (religiosity, liberties and its interaction). Column 1 regresses HOURSWORKED on religious intensity (REL<sub>INT</sub>), liberties (LIB<sub>40</sub>), some exogenous individual characteristics (gender and age) and country, survey and country-survey dummies. The coefficient of REL<sub>INT</sub> is negative but it is not precisely estimated (p-value .18). The effect of LIB<sub>40</sub> on effort is not significantly different from zero, in accordance with our theory that predicts that liberties foster or hinder effort depending on the degree of individual religiosity. Column 2 adds

the interaction of religiosity and liberties to a specification otherwise identical to that of column 1. The coefficient of the interacted term is negative and highly significant, as our theory predicts. On the other hand, the effect of  $REL_{INT}$  is now positive and significant suggesting that for moderate values of  $LIB_{40}$  the overall effect of  $REL_{INT}$  is ambiguous. We'll examine this point in detail below. The coefficient associated with  $LIB_{40}$ , that now captures the effect of liberties on effort when  $REL_{INT}$  is close to zero, is positive and significant, in accordance with our theory that predicts that liberties are an incentive for the secular. Column 3 shows that the results continue to hold when other individual controls are introduced in the regression. The results presented so far correspond to people that cohabit. Column 4 considers individuals independently of their cohabiting status (and introduces cohabitation as an additional control). The results remain very similar, except that the coefficient of  $LIB_{40}$  is not significant in this case.<sup>15</sup>

As there are good reasons to believe that  $REL_{INT}$  can be endogenous, we have reestimated columns 1–4 by 2SLS using the instrument introduced in Section 3.3.<sup>16</sup> The results, reported in columns 5-8 in Table 1, are very similar to the OLS results. For the sake of brevity, we focus on the results in column 7, our baseline specification henceforth, which reestimates column 3 in the same table. We start by analysing the first stage regression. There is a strong correlation between  $REL_{INT}$  and its instrument (around .5). At the bottom of Table 1 we report the value of the Cragg-Donald and the Kleibergen-Paap statistics for detecting weak instruments. Both statistics are much larger than their associated critical values.<sup>17</sup> However, one has to interpret this fact with caution as the large-sample validity of both tests has not been established when residuals are not i.i.d., something we cannot discard in our case.<sup>18</sup> To overcome this difficulty we also provide in Table 1 the p-value of the Anderson-Rubin (AR) statistic that is robust to weak instruments. This statistic tests the hypothesis that the coefficients of  $REL_{INT}$  and  $REL_{INT} \times LIB_{50}$  are jointly equal to zero, which is rejected at conventional significance levels. Table 5 provides further robustness checks that confirm that weak instruments is not a problem in our case.

As for the second stage, column 7 shows that the interaction of religiosity and liberties has

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<sup>15</sup>Notice, however, that when this equation is reestimated by 2SLS (column 8 in Table 1),  $LIB_{40}$  is significant (p-value .071).

<sup>16</sup>We construct the instrument for the interaction term of religious intensity and liberties simply by replacing  $REL_{INT}$  by  $REL_{INT}^{IV}$  in the product.

<sup>17</sup>The Stock and Yogo critical values corresponding to the 10% maximal size deviation is 7.04.

<sup>18</sup>In fact, the problem of testing for weak instruments when there are two potentially endogenous regressors and the errors are not i.i.d. is still an open question in the econometrics literature.

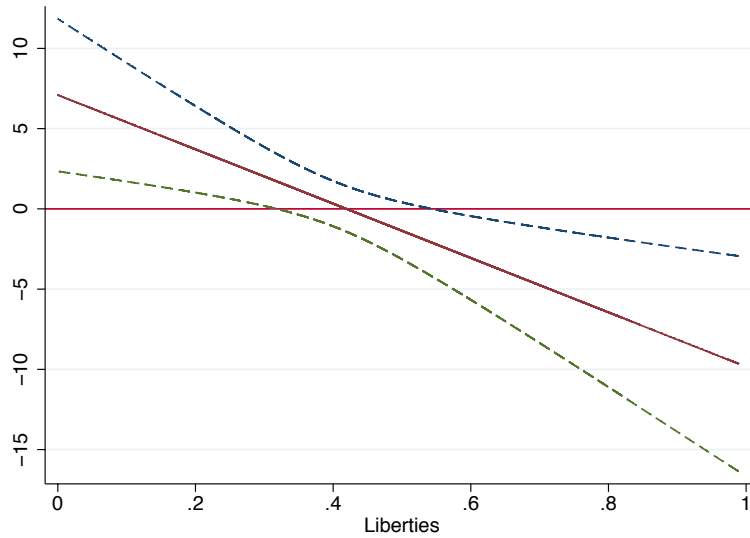


Figure 4: Mg effect of  $REL_{INT}$  on  $HOURSWORKED$

This graph depicts the marginal effect of  $REL_{INT}$  on  $HOURSWORKED$  as a function of  $LIB_{40}$  using the estimates reported in column 7, Table 1. Confidence bands at the 90% confidence level are also depicted.

a negative and significant effect on labor supply while the coefficient of religiosity is positive and significant. As mentioned before, the overall effect of religiosity is then, ambiguous, especially for moderate values of  $LIB_{40}$ . To assess the overall effect, Figure 4 plots the estimate of the marginal effect of religiosity on effort as a function of  $LIB_{40}$  (together with its confidence bands at the 90% confidence level). The marginal effect of religious intensity on effort is positive and significant for people with very low values in the liberties index (more specifically, for those in the lower 20% of the distribution of  $LIB_{40}$ ). However, as the liberties index gets larger, the marginal effect of religiosity becomes negative and significant. This is the case for individuals with a value of  $LIB_{40}$  larger than .54 (approximately 33% of the people in our sample). This result is in line with one of the key predictions of our theory: as liberties increase, the gap in the number of hours worked between religious and secular gets larger.

The magnitude of the effect of religiosity on effort is quite sizeable among individuals that have access to liberties. Focusing again on column 7 in Table 1, an increase in one standard deviation in the intensity of religious beliefs is associated with a decrease in the number of hours worked per week of 0.75, 1.39 or 1.8 hours for individuals with a value of  $LIB_{40}$  in the 75th, 95th and 99th percentile, respectively.

We now examine the second prediction of our theory, which states that liberties are an in-

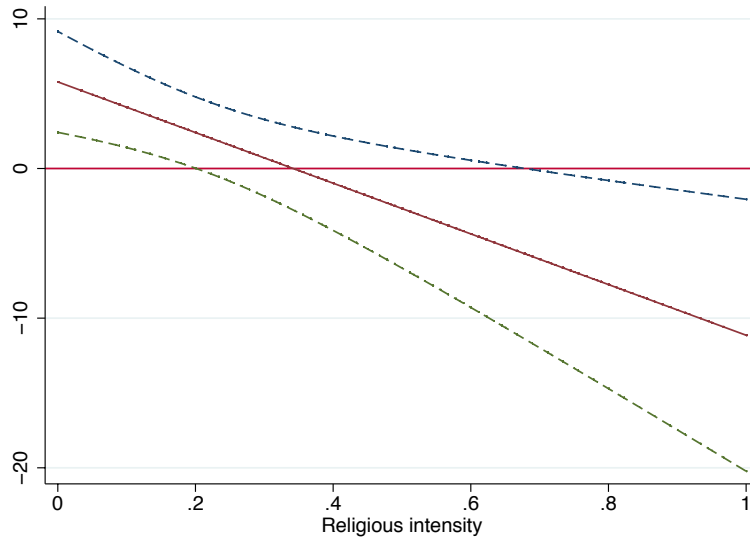


Figure 5: Mg effect of  $LIB_{40}$  on  $HOURSWORKED$

This graph depicts the marginal effect of  $LIB_{40}$  on  $HOURSWORKED$  as a function of  $REL_{INT}$  using the estimates reported in column 7, Table 1. Confidence bands at the 90% confidence level are also depicted.

centive to work for secular and a disincentive for religious. From equation (4), the value of  $\bar{x}$ , the threshold separating religious from seculars, is  $\bar{x} = -\beta_3/\beta_2$ , where  $\beta_2$  and  $\beta_3$  are the coefficients associated to  $REL_{INT} \times LIB_{40}$  and  $LIB_{40}$  respectively. Using the values of these coefficients from column 7 of Table 1, we obtain a value for  $\bar{x} = .34$ . Figure 5 plots the marginal effect of  $LIB_{40}$  on  $HOURSWORKED$  as a function of religious intensity. This graph shows that the effect of an increase in liberties is positive and significant for people with a value of  $REL_{INT}$  smaller than .2 (35% of the sample) and negative and significant for very religious individuals, those with a value of  $REL_{INT}$  greater than .67, which amounts to 20% of the sample, approximately.

Finally, the magnitude of the effect of liberties on effort is large for both seculars and religious. We provide two examples, for individuals in the 20th and in the 80th percentile of the distribution of  $REL_{INT}$ . In the former case, an increase in one standard deviation in  $LIB_{40}$  increases by .72 hours per week the number of hours worked. In the latter, a similar increase reduces by .92 hours the weekly amount of hours worked.

In the following we present alternative specifications to those presented in Table 1 that allow us to assess the robustness of the results.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
REL <sub>INT</sub>	3.032*** (0.002)	4.568 (0.111)	2.773** (0.012)	3.802 (0.250)	6.433*** (0.005)	2.589 (0.411)	1.521 (0.579)	4.953** (0.043)
LIB <sub>40</sub>	3.822** (0.019)	5.124** (0.027)	7.394*** (0.000)	8.646*** (0.001)	9.661*** (0.001)	14.295*** (0.000)	-0.029 (0.987)	3.941 (0.100)
REL <sub>INT</sub> × LIB <sub>40</sub>	-7.784*** (0.002)	-11.829* (0.068)	-9.595*** (0.000)	-13.121* (0.058)	-18.397*** (0.003)	-15.002** (0.023)	-3.177 (0.533)	-11.026** (0.014)
AGE <sup>2</sup>	-0.001 (0.160)	-0.001 (0.220)	-0.003*** (0.004)	-0.003*** (0.001)	0.001 (0.421)	-0.002*** (0.004)	-0.004*** (0.000)	-0.003** (0.011)
AGE	0.068 (0.215)	0.065 (0.272)	0.186** (0.020)	0.199*** (0.007)	-0.051 (0.500)	0.196*** (0.008)	0.349*** (0.000)	0.162* (0.085)
GENDER	-5.590*** (0.000)	-5.468*** (0.000)	-7.299*** (0.000)	-7.323*** (0.000)				
CHILDREN	-0.449* (0.053)	-0.566** (0.012)	-1.186*** (0.000)	-1.219*** (0.000)	-1.251*** (0.000)	-1.958*** (0.000)	-0.083 (0.675)	-0.210 (0.434)
EDUYRS	-0.082* (0.062)	-0.056 (0.176)	-0.015 (0.670)	-0.005 (0.881)	0.148** (0.030)	0.064 (0.200)	-0.019 (0.624)	-0.137*** (0.000)
HHSIZE	-0.092 (0.342)	-0.022 (0.800)	-0.057 (0.524)	-0.049 (0.595)	-0.263** (0.029)	-0.341*** (0.003)	0.349*** (0.000)	0.211** (0.027)
HEALTH	-0.117 (0.102)	-0.108 (0.136)	-0.204* (0.056)	-0.261*** (0.004)	0.018 (0.890)	-0.238 (0.142)	-0.169* (0.059)	-0.329*** (0.000)
EDU-PTNR	-0.135*** (0.000)	-0.122*** (0.000)	-0.248*** (0.001)	-0.236*** (0.000)	0.067 (0.147)	-0.164** (0.044)	0.009 (0.866)	-0.147*** (0.003)
c	41.629*** (0.000)	46.977*** (0.000)	35.386*** (0.000)	40.199*** (0.000)	51.280*** (0.000)	34.457*** (0.000)	40.469*** (0.000)	41.409*** (0.000)
Dep. var.	CONTRACTHOURS	CONTRACTHOURS	DESIREDHOURS	DESIREDHOURS	HOURSWORKED	DESIREDHOURS	HOURSWORKED	DESIREDHOURS
Sample	All	All	All	All	Women	Women	Men	Men
Estimation	OLS	2SLS	OLS	2SLS	2SLS	2SLS	2SLS	2SLS
R <sup>2</sup>	0.160	0.163	0.269	0.279	0.147	0.304	0.037	0.148
Obs	96446	89252	32094	29716	46677	15813	42741	13903

Table 2: EFFORT, RELIGIOSITY AND LIBERTIES: ALTERNATIVE DEPENDENT VARIABLES AND DISAGGREGATE RESULTS FOR MEN AND WOMEN.

Notes. Dependent variable is CONTRACTHOURS in columns 1–2, DESIREDHOURS in columns 3, 4, 6 and 8 and HOURSWORKED in columns 5 and 7. Columns 5 and 6 restrict the sample to women while columns 7 and 8 consider only men. All models contain country, survey and country-survey dummies. Estimation has been carried out by 2SLS except for columns 1 and 3, that are estimated by OLS. There are 34 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses. \* $p < 10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

## 4.2 Variations: Alternative dependent variables

Table 2 presents results using alternative ways of measuring effort. Columns 1 and 2 in Table 2 reestimate column 7 in Table 1 by OLS and 2SLS, respectively, using the number of contracted hours per week, CONTRACTHOURS, as dependent variable. Columns 3 and 4 are similar but have DESIREDHOURS as dependent variable. This measure has an important advantage over HOURSWORKED or CONTRACTHOURS as it is not affected by personal or labor-market constraints. As a drawback, however, it can only be found in two of the six waves of the ESS so the sample is considerably smaller. In all cases, the results are qualitatively and quantitatively similar to those obtained in our baseline specification.<sup>19</sup>

<sup>19</sup>Just to provide an example, using the estimates in column 2 of Table 2, we obtain that an increase in one standard deviation in the intensity of religious beliefs is associated with a decrease in the contracted number of hours per week of 0.62 hours. A similar increase in the intensity of religious beliefs is associated with a decrease in the desired number of hours per week of 1.05 hours for individuals with a value of LIB<sub>40</sub> in the 75th percentile (column 4).

### 4.3 Variations: women versus men

The second half of Table 2 (columns 5 to 8) presents results disaggregated by gender. Columns 5 and 6 restrict the sample to women while columns 7 and 8 do the same for men. We do so as many religions have different prescribed behaviour to men and women, typically restricting women rights and liberties. Also, most of the liberties we consider in this exercise affect women disproportionately than men. Therefore, it is reasonable to expect a larger effect for women.

The dependent variables are `HOURSWORKED` in columns 5 and 7 and `DESIREDHOURS` in columns 6 and 8. Religiosity is measured using `RELINT` and the estimation has been carried out using 2SLS. The results obtained when only women are considered are qualitatively very similar as those obtained for the whole population. Quantitatively, the effect is stronger, as expected.<sup>20</sup>

The picture differs when only men are considered and the dependent variable is `HOURSWORKED` (but is similar when the dependent variable is `DESIREDHOURS`). Column 7 shows that when the sample is restricted to men the coefficient on the interaction of religiosity and liberties retains the negative sign but is small and not significantly different from zero. The impact of the liberties variable is also not different from zero. However, as shown in Column 8, when the dependent variable is `DESIREDHOURS`, a similar pattern as when the whole sample is considered is found again: the coefficient of religiosity is positive and significant and that of the interaction between religiosity and liberties is negative and significant. These results imply that when `LIB40` is high, religious men would like to work less than secular.

The contrast between the results in columns 7 and 8 highlights the possibility that (religious) men's labor supply is highly inelastic: while religious men would like to work less when liberties are abundant, they might be unable to do so as their wives would also be more likely to stay at home.

Still, the results of the gender-segregated data may point to a story which is simpler than the one told in our model. It is possible that the legal restriction of liberties had prevented all women from working. When those were lifted, secular women had increased their labor supply while religious women were still bounded by the constraints imposed by religiosity. In Section 6 we

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<sup>20</sup>Focusing on column 5 in Table 2, an increase in one standard deviation in the intensity of religious beliefs of women is associated with a decrease in the number of hours worked of 1.15 hours or 1.86 hours for `LIB40` in the 75th or in 95th percentile, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]
REL <sub>AFF</sub>	1.613*** (0.001)	1.969*** (0.002)	1.461** (0.031)	1.336 (0.174)	1.267** (0.042)	2.394*** (0.001)
LIB <sub>40</sub>	2.093 (0.168)	6.838*** (0.001)	4.955** (0.042)	11.615*** (0.000)	0.094 (0.962)	2.596 (0.318)
REL <sub>AFF</sub> × LIB <sub>40</sub>	-3.583*** (0.003)	-4.931*** (0.001)	-4.289** (0.011)	-4.713** (0.032)	-1.913* (0.092)	-4.682*** (0.001)
AGE <sup>2</sup>	-0.002** (0.039)	-0.003*** (0.004)	0.001 (0.467)	-0.003*** (0.005)	-0.004*** (0.000)	-0.003** (0.019)
AGE	0.122* (0.071)	0.197** (0.019)	-0.050 (0.507)	0.207** (0.011)	0.342*** (0.000)	0.159 (0.103)
GENDER	-7.719*** (0.000)	-7.512*** (0.000)				
CHILDREN	-0.557** (0.028)	-1.143*** (0.000)	-1.027*** (0.009)	-1.846*** (0.000)	0.001 (0.997)	-0.217 (0.427)
EDUYRS	0.065 (0.246)	-0.010 (0.777)	0.117* (0.096)	0.063 (0.229)	-0.040 (0.336)	-0.133*** (0.000)
HHSIZE	-0.076 (0.480)	-0.104 (0.256)	-0.383*** (0.008)	-0.438*** (0.000)	0.240** (0.031)	0.223** (0.032)
HEALTH	-0.011 (0.914)	-0.194* (0.076)	0.014 (0.911)	-0.154 (0.357)	-0.181** (0.047)	-0.325*** (0.004)
EDU-PTNR	-0.062 (0.239)	-0.252*** (0.001)	0.020 (0.718)	-0.196* (0.051)	0.001 (0.991)	-0.148*** (0.005)
c	40.750*** (0.000)	37.745*** (0.000)	37.778*** (0.000)	22.158*** (0.000)	40.554*** (0.000)	38.807*** (0.000)
Dep. var.	HOURSWORKED	DESIREDHOURS	HOURSWORKED	DESIREDHOURS	HOURSWORKED	DESIREDHOURS
Sample	All	All	Women	Women	Men	Men
R <sup>2</sup>	0.150	0.272	0.142	0.292	0.042	0.143
Obs	95211	31006	49802	16666	45409	14340

Table 3: EFFORT, RELIGIOSITY AND LIBERTIES: RELIGIOUS AFFILIATION

*Notes.* Dependent variable is HOURSWORKED (columns 1, 3 and 5) and DESIREDHOURS (columns 2, 4 and 6). Columns 3 and 4 (5 and 6) restrict the sample to women (men). All models have been estimated by OLS and contain country, survey and country-survey dummies. There are 34 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

discuss alternative models including one that implies that religiosity simply imposes a constraint on effort (instead of affecting preferences for liberties). We explain there why the data is less supportive of such a theory.

#### 4.4 Variations: Religious Affiliation

Table 3 uses religious affiliation, REL<sub>AFF</sub>, as a proxy for religiosity.<sup>21</sup> We consider two dependent variables, reflecting both current and desired work hours (HOURSWORKED and DESIREDHOURS) and three different samples: the whole sample, one restricted to women and another restricted to men. Estimation has been carried by OLS throughout. Results are similar to those described in Tables 1 and 2. The interaction of liberties and religious affiliation has a negative and significant effect everywhere (even when the sample is restricted to men). The coefficient of LIB<sub>40</sub> is in general larger (and more significant) in the regressions that have desired work hours as dependent variable, which suggests that the secular would like to increase their labor supply when liberties increase more than

<sup>21</sup>Recall that REL<sub>AFF</sub> reports current religious affiliation. Table A3 in Appendix B.2 reproduces Table 3 using REL<sub>EVER</sub> instead, a dummy capturing whether the respondent has ever been religious. Results are very similar.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
REL <sub>INT</sub>	6.562** (0.025)	8.536** (0.022)		-0.775 (0.323)	3.739* (0.060)	0.745 (0.790)	13.676* (0.087)
LIB <sub>40</sub>	5.611*** (0.007)	6.885* (0.094)	6.207 (0.231)	6.136 (0.239)	7.226 (0.239)	2.591 (0.168)	7.821** (0.021)
REL <sub>INT</sub> × LIB <sub>40</sub>	-16.936** (0.016)	-22.334** (0.003)			-10.019** (0.011)	-7.417** (0.043)	-21.396** (0.031)
TRADITIONALISM	0.279*** (0.002)						
CONSERVATISM		-0.096 (0.731)	0.934 (0.123)	1.010* (0.090)	0.605 (0.320)		
CONSERVATISM × LIB <sub>40</sub>			-2.720* (0.053)	-2.750* (0.050)	-1.825 (0.185)		
REL <sub>INT</sub> × AGE						0.050 (0.116)	-0.101 (0.241)
AGE <sup>2</sup>	-0.002** (0.016)	-0.001 (0.303)	-0.001 (0.409)	-0.001 (0.444)	-0.001 (0.272)	-0.002** (0.018)	-0.001* (0.051)
AGE	0.129** (0.045)	0.057 (0.457)	0.037 (0.610)	0.033 (0.646)	0.057 (0.435)	0.124* (0.063)	0.144** (0.035)
GENDER	-7.629*** (0.000)	-8.200*** (0.000)	-8.324*** (0.000)	-8.244*** (0.000)	-8.247*** (0.000)	-7.680*** (0.000)	-7.623*** (0.000)
CHILDREN	-0.751*** (0.002)	-0.792*** (0.008)	-0.634** (0.050)	-0.632** (0.049)	-0.667** (0.036)	-0.566** (0.026)	-0.702*** (0.003)
EDUYRS	0.113** (0.043)	0.030 (0.652)	-0.036 (0.626)	-0.034 (0.648)	-0.026 (0.733)	0.068 (0.221)	0.100* (0.062)
HHSIZE	0.045 (0.609)	0.175 (0.168)	0.101 (0.429)	0.116 (0.349)	0.124 (0.316)	-0.058 (0.595)	0.024 (0.796)
HEALTH	0.009 (0.933)	-0.070 (0.686)	-0.081 (0.674)	-0.083 (0.665)	-0.084 (0.665)	-0.021 (0.838)	-0.009 (0.932)
EDU-PTNR	-0.032 (0.527)	-0.029 (0.601)	-0.051 (0.488)	-0.049 (0.503)	-0.047 (0.509)	-0.060 (0.253)	-0.033 (0.497)
c	48.041*** (0.000)	48.128*** (0.000)	50.005*** (0.000)	50.255*** (0.000)	48.873*** (0.000)	44.671*** (0.000)	43.785*** (0.000)
R <sup>2</sup>	0.153	0.163	0.161	0.161	0.162	0.150	0.150
Obs	86165	13888	14651	14646	14646	96448	89418

Table 4: EFFORT, RELIGIOSITY AND LIBERTIES: CONSERVATISM AND AGE EFFECTS

Notes. Dependent variable is HOURSWORKED. Columns 1, 2 and 7 have been estimated by 2SLS and columns 3 to 6 by OLS. All models contain country, survey and country-survey dummies. All models contain country and survey and country-survey dummies. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

they actually are able to do. The magnitude of the coefficients of LIB<sub>40</sub> also reveal that the impact of liberties on labor supply for secular women is in general larger than that for men.

#### 4.5 Variations: Conservatism and Age

Religiosity is a very complex phenomenon and this paper focuses exclusively on one of its features: the dislike of both the personal and the societal use of certain liberties. Although rejection of liberties is a key aspect of most religions, it is clear that not all religious are conservative and that not all conservative are religious. Thus, one potential concern is that it is conservatism, and not religiosity, what is driving the results. Disentangling this is not straightforward since, as documented in Section 5.1 below, the correlation between religiosity and conservatism is strong. Table 4 shows that our results are robust to explicitly controlling by measures of traditionalism/conservatism. Column 1 in Table 4 adds to our baseline specification the variable TRADITIONALISM, that measures (in a



increasing scale) the extent to which individuals like to follow traditions. Column 2 is similar but considers a more direct proxy of dislike of liberties, `CONSERVATISM`, which is constructed as the average of 4 variables that reflect rejection of liberties such as gay rights, divorce and women's role in the job market, see Appendix A.1 for a description of this variable. Our main conclusions are robust to including these variables.

Columns 3 to 5 use `CONSERVATISM` in place of religiosity. That is, we introduce in the regression `CONSERVATISM` and its interaction with `LIB40`.<sup>22</sup> If the theory we postulate is true, we should find that the sign of this interaction is negative and significant. Column 3 shows that this is the case in a regression where religiosity (and its interaction) have been omitted. Column 4 adds `RELINT` to the specification and the results do not change. Column 5 introduces as well the interaction of religiosity and liberties. When we do this, the significance of the interaction between conservatism and liberties disappears while that of religiosity and liberties does not.

Summarizing, our results are robust to controlling by conservatism/traditionalism. Furthermore, the negative and significant coefficient of `CONSERVATISM`×`LIB40` found in columns 3 and 4 is consistent with the channel we postulate in this paper. Finally, the fact that in a horse race between religiosity and conservatism (column 5) the former keeps its significance while the latter does not, suggests that religiosity is a better proxy for the type of mechanism we are postulating.

An additional concern is that the `LIB` variable can be quite correlated with age, as older people have been exposed to less liberties throughout their lifetime. Thus, those measures can be capturing some age effects rather than the effect of liberties. Column 6 adds to the baseline specification the interaction of religiosity and age and the estimation has been carried out by OLS. The coefficient of the interaction of age and religiosity is very small and not significantly different from zero and, otherwise, results remain similar as before. Column 7 shows that when 2SLS is employed, similar results are found.

#### 4.6 Variations: Robustness of the IV estimation

Despite its popularity 2SLS is known to perform poorly in several situations, especially when instruments are weakly correlated with the endogenous variables. In these situations, other estimation methods, such as limited information maximum likelihood (LIML) and Fuller methods, have been

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<sup>22</sup>As we don't have a good instrument for `CONSERVATISM`, columns 3 to 6 are estimated by OLS.

	[1]	[2]	[3]	[4]	[5]	[6]
RELINT	7.089** (0.014)	7.089** (0.014)	7.746** (0.017)	8.373** (0.006)	8.483** (0.011)	9.275** (0.012)
LIB40	5.788** (0.005)	5.788** (0.005)	6.389** (0.006)	6.195** (0.000)		
LIB50					6.583** (0.011)	
LIB60						5.031** (0.046)
RELINT × LIB40	-16.929** (0.013)	-16.929** (0.013)	-17.899** (0.021)	-17.705** (0.012)		
RELINT × LIB50					-19.170** (0.009)	
RELINT × LIB60						-20.470** (0.009)
AGE <sup>2</sup>	-0.002** (0.021)	-0.002** (0.021)	-0.001* (0.097)	-0.002** (0.042)	-0.002** (0.016)	-0.002** (0.015)
AGE	0.131** (0.046)	0.131** (0.046)	0.085 (0.181)	0.135* (0.070)	0.131** (0.039)	0.131** (0.047)
GENDER	-7.620** (0.000)	-7.620** (0.000)	-8.075** (0.000)	-7.512** (0.000)	-7.624** (0.000)	-7.626** (0.000)
CHILDREN	-0.720** (0.002)	-0.720** (0.002)	-0.817** (0.002)	-0.761** (0.005)	-0.718** (0.002)	-0.716** (0.002)
EDUYRS	0.102* (0.060)	0.102* (0.060)	0.095* (0.096)	0.080 (0.155)	0.102* (0.059)	0.103* (0.059)
HHSIZE	0.033 (0.716)	0.033 (0.716)	0.064 (0.514)	0.082 (0.399)	0.030 (0.740)	0.024 (0.794)
HEALTH	-0.010 (0.926)	-0.010 (0.926)	0.039 (0.741)	-0.019 (0.867)	-0.010 (0.925)	-0.006 (0.958)
EDU-PTNR	-0.035 (0.470)	-0.035 (0.470)	-0.035 (0.482)	-0.044 (0.349)	-0.034 (0.496)	-0.032 (0.522)
c	46.238** (0.000)	45.907** (0.000)	52.929** (0.000)	50.934** (0.000)	45.205** (0.000)	46.020** (0.000)
R <sup>2</sup>	0.151	0.151	0.156	0.143	0.151	0.150
Obs	89418	89418	77698	68344	89418	89418

Table 5: EFFORT, RELIGIOSITY AND LIBERTIES: IV ESTIMATION

*Notes.* Dependent variable is HOURSWORKED. Columns 1 and 2 have been estimated by LIML and Fuller methods, respectively, while columns 3 to 6 by 2SLS. Column 3 drops from the sample the least religious countries while column 4 excludes individuals from non-dominant religions. Columns 5 and 6 consider alternative definitions of individual liberties. See the main text for more detailed explanations. All models contain country and survey and country-survey dummies. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

shown to be more robust than 2SLS (see Andrews and Stock, 2007). For the sake of robustness, we have reestimated our baseline specification (column 7 in Table 1) using these two estimation procedures. Results are reported in columns 1 and 2 of Table 5, respectively.<sup>23</sup> Results are virtually identical, showing that weak instruments is not a problem in our case.

Columns 3 and 4 in Table 5 present further robustness checks to the IV estimation strategy. Column 3 drops the least religious countries from the sample (those with a share of religious individuals smaller than 50%).<sup>24</sup> Since these societies are nowadays eminently secular, individuals that have remained religious through the secularisation process might differ significantly from non-religious individuals for reasons other than their religiosity. Column 4 excludes from the sample religious individuals whose religious denomination is not the dominant in the country. By doing

<sup>23</sup>The value of the parameter  $\alpha$  needed in the implementation of Fuller's method is set equal to 1.

<sup>24</sup>These countries are Sweden, Latvia, Estonia and Czech Republic.

this, we want to exclude minority groups (like muslims in most European countries) whose (un-observed) individual characteristics and access to the job market can differ substantially from individuals belonging to the dominant religion for reasons other than their religiosity. Results remain robust to these variations.

Finally, as in any IV analysis, we cannot entirely exclude the possibility that our instruments violate the exclusion restriction. As mentioned earlier, this would be the case, for instance, if religious affiliation is transmitted from parents to children (through education or genes) along with other factors that have a direct impact on *ability*. To examine the robustness of our IV estimates to violation of this hypothesis, we use the method proposed by Conley, Hansen and Rossi (2012). In this way, we can examine the consequences of a possible direct effect on our instruments on individual effort. Appendix B.3 summarises this analysis. It shows that our results are very robust to violations of the exclusion restriction.

#### **4.7 Variations: Alternative measures of liberties**

Finally, columns 5 and 6 in Table 5 reestimate our baseline specification using alternative measures of individual liberties:  $LIB_{50}$  and  $LIB_{60}$ . Our conclusions remain robust to using these measures.

### **5 Testing the model's assumptions**

Our theoretical model's main assumption is that religiosity directly affects individual preferences through the valuation of personal liberties. We have then predicted that when the complementarity between liberties and consumption is higher than that of leisure and liberties, religiosity would have an adverse influence on the choice of effort. Our empirical results are in line with this prediction, where we find that religiosity interacted with liberties has a significant and sizeable negative effect on labor supply.

The empirical results could have been caused however by channels that might be different from the one postulated in our model. In the next section we discuss potential alternative channels. In this section we directly test the assumptions of the model. We explore whether there is independent evidence supporting each of the steps in our chain of reasoning: (a) do religious people tend to be more conservative than secular in their appreciation for individual rights? (b) is there a

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
REL <sub>INT</sub>	1.391*** (0.000)		0.986*** (0.000)		0.966*** (0.000)		0.761*** (0.000)	
REL <sub>EVER</sub>		0.331*** (0.000)		0.194*** (0.000)		0.243*** (0.000)		0.148*** (0.000)
LIB <sub>40</sub>	0.376 (0.216)	0.188 (0.573)	0.005 (0.990)	-0.079 (0.855)	-0.113 (0.804)	-0.226 (0.640)	-0.346 (0.504)	-0.437 (0.414)
AGE <sup>2</sup>	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
AGE	-0.015*** (0.001)	-0.018*** (0.001)	-0.050*** (0.000)	-0.051*** (0.000)	-0.038*** (0.000)	-0.041*** (0.000)	-0.038*** (0.000)	-0.038*** (0.000)
GENDER	-0.514*** (0.000)	-0.396*** (0.000)	-0.731*** (0.000)	-0.637*** (0.000)	-0.205*** (0.000)	-0.126*** (0.002)	-0.567*** (0.000)	-0.491*** (0.000)
COHAB	-0.025 (0.124)	-0.026 (0.138)	-0.264*** (0.000)	-0.271*** (0.000)	-0.097*** (0.000)	-0.101*** (0.000)	-0.161*** (0.000)	-0.163*** (0.000)
CHILDREN	-0.017 (0.471)	-0.019 (0.461)	-0.159*** (0.000)	-0.160*** (0.000)	0.024 (0.304)	0.028 (0.217)	-0.106*** (0.003)	-0.109*** (0.004)
EDUYRS	-0.065*** (0.000)	-0.068*** (0.000)	-0.039*** (0.000)	-0.040*** (0.000)	-0.064*** (0.000)	-0.066*** (0.000)	-0.123*** (0.000)	-0.122*** (0.000)
HHSIZE	0.062*** (0.000)	0.082*** (0.000)	0.103*** (0.000)	0.111*** (0.000)	0.053*** (0.000)	0.065*** (0.000)	0.067*** (0.000)	0.079*** (0.000)
HEALTH	0.080*** (0.000)	0.083*** (0.000)	0.021 (0.293)	0.023 (0.286)	0.027 (0.166)	0.028 (0.150)	0.092*** (0.000)	0.090*** (0.000)
Dep. var.	GAYRIGHTS	GAYRIGHTS	DIVORCE	DIVORCE	WOMEN-DROPJOB	WOMEN-DROPJOB	WOMEN-LESSRIGHT	WOMEN-LESSRIGHT
Pseudo R <sup>2</sup>	0.102	0.094	0.076	0.072	0.069	0.064	0.098	0.093
Obs	157109	155350	26706	25404	55081	53673	27036	25726

Table 6: RELIGIOSITY AND LIBERTIES

*Notes.* Dependent variables are GAYRIGHTS (columns 1-2), DIVORCE (columns 3-4), WOMEN-DROPJOB (column 5-6) and WOMEN-LESSRIGHT (column 7-8). All models contain country, survey and country-survey dummies and have been estimated by maximum likelihood in an ordinal logit specification. There are 34 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

complementarity between consumption and liberties so that religious people value less an increase in consumption than their secular counterparts, especially when liberties are high? and (c) is there a similar complementarity between liberties and leisure?

## 5.1 Do religious people dislike liberties?

At the core of our analysis is the assumption that religious people dislike liberties. There is empirical evidence supporting this conjecture (see for instance Guiso et al. 2003 and Inglehart and Norris, 2003). We shall show that these results are corroborated in our sample. The ESS contain a few questions that allow us to examine this conjecture. We consider variables related to attitudes towards divorce (DIVORCE) and towards the role of women in the job market: WOMEN-DROPJOB and WOMEN-LESSRIGHT. The two latter variables reflect beliefs about whether women should be prepared to cut down on paid work for the sake of family and about whether men should have more right to jobs when jobs are scarce, respectively. We have also included intolerance towards gay rights, GAYRIGHTS. All variables have been normalised so that higher values (in a scale from 1 to 5) reveal a higher degree of intolerance, see Appendix A for exact definitions of these variables.

	[1]	[2]	[3]	[4]	[5]	[6]
REL <sub>INT</sub>	-0.221*** (0.000)	0.002 (0.988)	0.007 (0.961)	0.022 (0.880)	-0.005 (0.949)	
REL <sub>EVER</sub>						0.170** (0.030)
LIB <sub>40</sub>	-0.176 (0.471)	-0.003 (0.990)			-0.014 (0.931)	0.075 (0.734)
LIB <sub>50</sub>			0.067 (0.799)			
LIB <sub>60</sub>				0.103 (0.720)		
REL <sub>INT</sub> × LIB <sub>40</sub>		-0.501** (0.023)			-0.317** (0.036)	
REL <sub>INT</sub> × LIB <sub>50</sub>			-0.489** (0.043)			
REL <sub>INT</sub> × LIB <sub>60</sub>				-0.512** (0.047)		
REL <sub>EVER</sub> × LIB <sub>40</sub>						-0.291** (0.016)
AGE <sup>2</sup>	0.000*** (0.003)	0.000*** (0.007)	0.000*** (0.007)	0.000*** (0.005)	0.000*** (0.001)	0.000*** (0.011)
AGE	-0.038*** (0.000)	-0.037*** (0.000)	-0.037*** (0.000)	-0.037*** (0.000)	-0.028*** (0.000)	-0.036*** (0.000)
GENDER	-0.445*** (0.000)	-0.446*** (0.000)	-0.446*** (0.000)	-0.446*** (0.000)	-0.297*** (0.000)	-0.465*** (0.000)
CHILDREN	-0.037* (0.077)	-0.039* (0.057)	-0.040** (0.046)	-0.040** (0.037)	-0.025* (0.056)	-0.038* (0.065)
EDUYRS	0.004 (0.428)	0.004 (0.360)	0.004 (0.380)	0.004 (0.388)	0.001 (0.824)	0.004 (0.398)
HHSIZE	-0.018** (0.037)	-0.018** (0.039)	-0.018** (0.038)	-0.018** (0.037)	-0.013** (0.029)	-0.023*** (0.010)
HEALTH	-0.086*** (0.000)	-0.086*** (0.000)	-0.086*** (0.000)	-0.087*** (0.000)	-0.057*** (0.000)	-0.088*** (0.000)
COHAB	-0.069*** (0.000)	-0.069*** (0.000)	-0.069*** (0.000)	-0.069*** (0.000)	-0.036*** (0.002)	-0.066*** (0.000)
c					3.637*** (0.000)	
(Pseudo) R <sup>2</sup>	0.054	0.054	0.054	0.054	156704	0.054
Obs	156704	156704	156704	156704	156704	155070

Table 7: VALUATION OF CONSUMPTION

*Notes.* Dependent variable is VALUE-CONSUMP. All models contain country, survey and country-survey dummies and have been estimated by maximum likelihood in an ordinal logit specification, except column 5 that has been estimated by OLS. There are 33 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

Table 6 reports the output of regressing each of these variables on a measure of religiosity (either affiliation or intensity), a list of standard individual controls (the same ones we use in our main specifications), and country, survey and country-survey fixed effects. The results show that both religious affiliation and religious intensity are strongly associated with more intolerant attitudes towards gay rights (column 1-2), divorce (columns 3-4) and women's role in the job market (columns 5-8).

## 5.2 Do religiosity and liberties jointly affect the valuation of consumption and leisure?

Proposition 1 focuses on the case in which there is larger complementarity between liberties and consumption than between liberties and leisure. Under this condition we derive that an increase in religiosity reduces incentives to work. We now provide evidence that this is indeed the relevant

	[1]	[2]	[3]	[4]	[5]	[6]
REL <sub>INT</sub>	-0.382*** (0.000)	-0.462** (0.012)	-0.493** (0.017)	-0.513** (0.021)	-0.299** (0.020)	
REL <sub>EVER</sub>						-0.198** (0.020)
LIB <sub>40</sub>	0.046 (0.893)	-0.017 (0.961)			0.039 (0.877)	-0.030 (0.931)
LIB <sub>50</sub>			0.096 (0.834)			
LIB <sub>60</sub>				0.064 (0.904)		
REL <sub>INT</sub> × LIB <sub>40</sub>		0.182 (0.583)			0.108 (0.632)	
REL <sub>INT</sub> × LIB <sub>50</sub>			0.245 (0.508)			
REL <sub>INT</sub> × LIB <sub>60</sub>				0.281 (0.478)		
REL <sub>EVER</sub> × LIB <sub>40</sub>						0.184 (0.211)
AGE <sup>2</sup>	0.000** (0.012)	0.000*** (0.007)	0.000*** (0.004)	0.000*** (0.004)	0.000** (0.022)	0.000** (0.023)
AGE	-0.040*** (0.000)	-0.041*** (0.000)	-0.041*** (0.000)	-0.041*** (0.000)	-0.025*** (0.000)	-0.039*** (0.000)
GENDER	-0.113*** (0.002)	-0.113*** (0.002)	-0.113*** (0.002)	-0.113*** (0.002)	-0.076*** (0.004)	-0.146*** (0.000)
GENDER	-0.133*** (0.000)	-0.133*** (0.000)	-0.132*** (0.000)	-0.131*** (0.000)	-0.083*** (0.000)	-0.133*** (0.000)
EDUYRS	0.016*** (0.004)	0.016*** (0.005)	0.015*** (0.005)	0.015*** (0.005)	0.012*** (0.003)	0.017*** (0.003)
HHSIZE	-0.056*** (0.000)	-0.056*** (0.000)	-0.056*** (0.000)	-0.056*** (0.000)	-0.040*** (0.000)	-0.061*** (0.000)
HEALTH	-0.170*** (0.000)	-0.170*** (0.000)	-0.170*** (0.000)	-0.170*** (0.000)	-0.114*** (0.000)	-0.171*** (0.000)
COHAB	0.047*** (0.003)	0.047*** (0.003)	0.047*** (0.003)	0.047*** (0.003)	0.024** (0.032)	0.048*** (0.002)
(Pseudo) R <sup>2</sup>	0.049	0.049	0.049	0.049		0.049
Obs	155910	155910	155910	155910	155910	154279

Table 8: VALUATION OF LEISURE

Notes. Dependent variable is VALUE-LEISURE. All models contain country and survey dummies and have been estimated by maximum likelihood in an ordinal logit specification except for column 5 that has been estimated by OLS. There are 33 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

case.

The ESS contain a question that explicitly addresses how individuals value an increase of consumption and wealth (VALUE-CONSUMP). More specifically, (VALUE-CONSUMP) measures *the importance of being rich, having money and expensive goods*. It takes 6 values, ranging from not at all important to very important. Table 7 explores whether there is a joint effect of religiosity and liberties on VALUE-CONSUMP. All columns are estimated by maximum likelihood in an ordinal logit specification with the exception of column 5 that has been estimated by OLS. Column 1 regresses VALUE-CONSUMP on religious intensity, REL<sub>INT</sub>, a measure of liberties (LIB<sub>40</sub>), a list of individual controls similar to the one employed in Section 4.1 and country and survey fixed effects. The sign of REL<sub>INT</sub> is negative, confirming the common wisdom that religious people value less material wealth. Column 2 introduces the interaction of religious beliefs and liberties. We are primarily interested in the sign of this interaction that we postulate to be negative. Column 2 shows that

the coefficient of the interaction is negative and significant (p-value .023). On the other hand, the significance of  $REL_{INT}$  vanishes once the interaction of religiosity and liberties is introduced in the regression. Columns 3 and 4 use alternative definitions of liberties ( $LIB_{50}$  and  $LIB_{60}$ , respectively) and a similar result is found. Column 5 reestimates column 2 using a linear specification, rather than an ordinal logit one, in order to facilitate the interpretation of the interacted terms. The product of religiosity and liberties has a negative and significant coefficient at the 5% significance level also in this case. Finally, column 6 replicates once more column 2 considering this time religious affiliation ( $REL_{EVER}$ ) instead of religious intensity and similar results are also obtained. In sum, results in Table 7 indicate that the interaction of religiosity and liberties has a significant effect on the valuation of consumption.

To complete our argument we need to show that the effect of such interacted term on the valuation of leisure is smaller than the effect on the valuation of consumption (see Proposition 1). To this effect we also run similar regressions as those presented in Table 7 using a proxy for the valuation of leisure as dependent variable.  $VALUE-LEISURE$  reflects *the importance of having a good time*, measured on a 1 to 6 scale where 6 reflects maximum valuation. Table 8 is identical to Table 7 except that the dependent variable is  $VALUE-LEISURE$ . Column 1 shows that religious intensity is negatively associated with  $VALUE-LEISURE$ . In contrast to Table 7, columns 2 to 6 show that the interaction between religiosity and liberties is not significantly different from zero. These results suggest that the data don't support the existence of a complementarity between leisure and the interaction religiosity/liberties, in line with our assumptions in Proposition 1.

## 6 Other potential channels

We have proposed, tested and verified empirically the results of the model, as well as its assumptions. There may be other, perhaps simpler, models, that can complement our explanations and generate similar results. We now discuss such possible models. Our discussion highlights the observation that negative externalities in the valuation of liberties plays an important role in explaining our empirical results.

## 6.1 Religiosity as a direct constraint on (female) effort

One possible alternative model is that religiosity implies a direct constraint on the choice of effort, with no influence on preferences. In Iannaccone (1992) and Azzi and Ehrenberg (1975), religious individuals have to decide how much to invest in religious activities versus standard effort, and thus religiosity restricts their labor supply almost directly. Moreover, many religions advocate the view that women have to stay at home.

Given that our liberties index has many laws pertaining to women rights, let us consider a model in which all women are directly constrained due to social or legal norms in terms of their effort choice by some level  $e_M$ , with religious women being more constrained and thus  $e_R < e_M$ . In such a model preferences are only defined over consumption and effort (with no liberties). Religiosity does not affect preferences, but the level of religiosity implies how much an individual feels bound by the constraints on effort. It is straightforward that in such a model we have the following predictions. First, labor supply would decrease in religiosity. Second, when  $e_M$  is relaxed -as follows from our liberties index- this would increase the effort of secular women, but would have no effect on the effort of the religious. For singles, this also has no implication for the effort of secular man, while for couples this may decrease the effort (actual or desired) of secular man. For religious men, relaxing  $e_M$  would not affect their labour supply (under the assumption that family members are either both religious or both secular).

Our empirical findings illustrate, somewhat in contrast, that (i) an increase in liberties, here modelled as relaxing  $e_M$ , increases the actual effort of secular women but reduces the effort of religious women, and that (ii) relaxing  $e_M$  increases the desired hours of work for secular men and decreases them for religious men. Given that we are controlling for many features such as education, the second observation is at odds with a model that looks at family labor considerations under the assumed direct constraints.

It is also possible to consider a related model in which, instead of direct constraints on effort, religiosity affects preferences indirectly. That is, religious individuals and particularly religious women would find effort more costly, or would perceive the returns to effort to be lower. Again, liberties are not part of the utility function. Such a model would generate similar results to the model with direct constraints.



While some of the effects described above are surely at play when looking at the raw effect of religiosity on effort, and can complement our model, it is also clear that the relation between an increase in liberties and the reduction of actual or desired effort by religious individuals indicates the presence of negative externalities that such liberties cause. We next discuss different modelling approaches for such externalities.

## 6.2 Other specifications of the externalities

The empirical evidence indicates that liberties generate externalities for religious individuals. In our model we have introduced this externality in the valuation of the cap on individual liberties. The importance of this externality depends of a parameter  $\alpha$  that we take as exogenous and specific of the culture of each religious affiliation. But there are other ways of specifying the role of externalities.

One possible line is to endogenize the value of  $\alpha$  as in Lindbeck et al. (2003). There, the unemployed individuals suffer a moral pressure that is decreasing in the number of unemployed. In our case, the equivalent assumption would be that the negative weight given by religious to liberties depends on the behavior of the secular. The externality is stronger the more individuals in society actually consume a higher level of liberties compared with the religious ideal. For the specific model we have discussed above in which religiosity imposes a direct or indirect constraint on exerting effort, we would have the following implication. If because of an increase in  $e_M$  religious individuals see the secular working harder, they would be less negative on working beyond the religious norm  $e_R$ . But in this case, an increase in the labor effort of secular women would induce religious women to increase their effort, which is not what we observe.

Of course one can also think of the opposite externality effect: the higher is the legal cap, so that seculars work more, the more the religious tightens its grip, possibly given the loosening of norms in the rest of society. This type of externality can come from a religious theology that links God's punishment with some average behavior in society.<sup>25</sup> While such direct restriction on effort would be tantamount to assuming the result and seems less natural than assuming an externality via preferences, it may be an avenue for future empirical research. Specifically, it would

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<sup>25</sup>Levy and Razin (2012) provide an informational justification for the externalities: religious organizations that are concerned about maintaining beliefs that sins are punished, would prefer individuals not to observe others who sin and are possibly not punished.

be interesting to examine how religious organizations have responded to the legal relaxation of personal liberties in the last fifty years.

## 7 Concluding Remarks

We have shown, theoretically and empirically, that religious negative views on liberties reduce labor effort and that this effect is stronger the higher is the legal cap on liberties. This negative relationship between individual effort and the interaction of religiosity with liberties is novel and robust. A key implication of the results is that negative externalities play an important role in the attitudes of religious individuals to the width or practice of liberties in society.

Our model has a number of interesting implications for research. First, at the aggregate level, our model implies that per capita income is positively related to secularism. This is in line with the findings of Barro and McCleary (2003) who show that religious societies (with higher participation in rituals) exhibit lower GDP, although they also show that beliefs in heaven and hell increase output.<sup>26</sup> But, in addition, our model also predicts that the availability of personal liberties will increase inequality (as seculars have more incentives to work but religious don't). Testing these predictions on aggregate output and income inequality is in our research agenda.

A second set of associated questions is examined in Esteban, Levy and Mayoral (2015) where we study the role of religiosity in the political choices over redistribution and individual liberties. As negative externalities play an important role, it is not surprising that religious groups advocate restrictions of personal liberties. We show how political pressures for the restriction of liberties are intertwined with the politics of redistribution, and that religious views against personal liberties can lead to both repression of liberties and low levels of redistribution in society.

Our last remark concerns the significant role of externalities in shaping individual preferences and behavior, accordingly with our empirical results. The externality effect of liberties can be viewed as a cultural factor specific to each religion. At one extreme we may have for instance the radical interpretations of Islam for which the main role of the state is to implement the religious norms, Catholicism at the time of the Inquisition, or Jewish beliefs that God may punish all

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<sup>26</sup>This negative relationship also arises in other models of religion as for example in Iannaccone (1992) or Levy and Razin (2012) where religious agents devote time to non-productive religious activity such as rituals. Benabou et al (2013) show a negative relationship between religiosity and output or growth through the negative religious attitudes on scientific innovations and technological progress.

even if only some have sinned. At the other end there are the forms of Protestantism that focus on the personal relationship with god, independently of what the others might be doing. In our model, religions that are more individualistic could induce a less negative effect of wide liberties on labor effort. Hence, differences across religions in the weight assigned to the externality of liberties could explain differences in individual and aggregate labor effort. This would provide an explanation complementary to Weber's (1904) as to why Protestantism became more conducive to growth than Catholicism. We leave for future research the precise identification and measurement of this externality factor across different cultures and religious affiliations.

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# A Appendix

## A.1 Variable definition

This section presents detailed definitions for the variables employed in the empirical analysis.

REL<sub>AFF</sub>: Dummy variable based on the question: *Do you consider yourself as belonging to any particular religion or denomination?*

REL<sub>EVER</sub>: Dummy variable based on the question: *Have you ever considered yourself as belonging to any particular religion or denomination, either currently or in the past?*

REL<sub>INT</sub>: 0-1 index computed as the simple average of RELIGIOSITY, PRAY and ATTENDANCE.

RELIGIOSITY: *Regardless of whether you belong to a particular religion, how religious would you say you are?.* Answers range from “not at all religious” (0) to “very religious” (10). The index has been renormalised to be between 0 and 1.

PRAY: *Apart from when you are at religious services, how often, if at all, do you pray?* Answers range from never (1) to everyday (7). The index has been renormalised to be between 0 and 1.

ATTENDANCE: *Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?* Answers range from never (1) to everyday (7). The index has been renormalised to be between 0 and 1.

REL<sub>INT</sub><sup>IV</sup>: Instrument for REL<sub>INT</sub>, see Section 3.3 for a description of how it has been computed.

CONTRACTHOURS: Number of hours worked, obtained from the question *What are/were your total “basic” or contracted hours each week (in your main job), excluding any paid and unpaid overtime?*

HOURSWORKED: Number of hours worked, obtained from the question *Regardless of your basic or contracted hours, how many hours do/did you normally work a week (in your main job), including any paid or unpaid overtime?*

DESIREDHOURS: Number of desired hours worked, based on the question *How many hours a week, if any, would you choose to work, bearing in mind that your earnings would go up or down according to how many hours you work?*

LIB<sub>C</sub>: Individual-specific liberties variable, computed as the average of the (country-level) liberties index corresponding to the years when the individual was between 18 and G years of age, with  $G = \{40, 50 \text{ and } 60\}$ . See Section A.2 for details on the construction of the liberties index.

AGE: Age of respondent, calculated from year of birth.

COHAB: Dummy variable equal to 1 if respondent lives with husband/wife/partner.

CHILDREN: Dummy variable if respondent lives with children.

EDUYRS: Years of full-time education completed.

EDU-PTNR: Highest level of education successfully completed of husband/wife/partner.

HHSIZE: Number of people living regularly as member of household

HEALTH: Subjective measure of own's health ranging from 1 (very good) to 5 (very bad).

VALUE-CONSUMPTION. *It is important to be rich, have a lot of money and expensive things.*

Answers range from 1 (not at all important) to 6 (very important).

VALUE-LEISURE. *It is important to have a good time.* Answers range from 1 (not at all important) to 6 (very important).

GAYRIGHTS: *Gay men and lesbians should be free to live their own life as they wish.* Answers range from 1 (strongly agree) to 5 (strongly disagree).

WOMEN-DROPJOB: *Women should be prepared to cut down on paid work for sake of family?* Answers range from 1 (strongly disagree) to 5 (strongly agree).

WOMEN-LESSRIGHT: *Men should have more right to job than women when jobs are scarce.* Answers range from 1 (strongly disagree) to 5 (strongly agree).

DIVORCE: *Children in home, parents should stay together even if don't get along.* Answers range from 1 (strongly disagree) to 5 (strongly agree).

CONSERVATISM: It is computed as the simple average of DIVORCE, WOMEN-LESSRIGHT, WOMEN-DROPJOB and GAYRIGHTS.

TRADITIONALISM: *Tradition is important to her/him. She/he tries to follow the customs handed down by her/his religion or her/his family..* Answers range from 1 (not at all like me) to 6 (very much me).

## **A.2 Construction of the personal liberties index**

The personal liberties index reflects the evolution of the legislation on abortion, divorce, women's rights, LGBT rights, and euthanasia from 1960 to 2013. To elaborate the index, we have first constructed individual indices for each of these categories as follows.



- Abortion index: We consider whether abortion is allowed in the following situations: 1) to save mother's life, 2) to preserve physical health, 3) to preserve mental health, 4) if pregnancy is due to rape or incest, 5) in case of fetal impairment, 6) for economic or social reasons and 7) on request. For each country and year, a value of 1 is assigned if abortion is allowed in each of the above mentioned scenarios and zero otherwise. The abortion index for that country/year is the average of the assigned quantities. Sources: UN Population Division. Abortion Policies: A Global Review, Volume 3 (2002), data updated with information from national pages.
- LGBT rights index: We have coded whether the following items are legal: 1) same-sex sexual activities, 2) same-sex unions, 3) adoption by same-sex couples, and 4) same-sex marriage. For each country and year, a value of 1 is assigned to each of these categories in case it is legal and zero otherwise. The LGBT rights index is computed as the average of the resulting quantities. Sources: Wikipedia ([https://en.wikipedia.org/wiki/LGBT\\_rights\\_in\\_Europe](https://en.wikipedia.org/wiki/LGBT_rights_in_Europe)), Pew Research Center.
- Divorce index: For each country and year we've coded whether 1) divorce is legal, 2) no-fault divorce is legal (i.e. if divorce is allowed on grounds other than fault, such as mutual consent) and 3) unilateral divorce is legal. The divorce index is computed as the previous cases. Sources: Boele-Woelki et al. (2003, 2004 and 2005), Smith (2002), and Gonzalez and Viitanen (2009).
- Euthanasia index: a 1 is assigned to country/years where euthanasia is legal. Sources: [www.euthanasia.com](http://www.euthanasia.com) and <http://www.wisegeek.com/which-countries-have-legalized-euthanasia.htm>.
- Women's rights index: The extent of gender parity has been captured through 17 different indicators related to property ownership, marital regimes, inheritance laws, status and capacity, access to judicial system and Constitutional rights. Data has been obtained from the the World Bank, 50 Years of Women's Legal Rights, <http://wbl.worldbank.org/data/timeseries>. See that webpage for more details on the categories included in the index.

To elaborate the personal liberties index, we have computed the simple average of the

country	HOURSWORKED	DESIREDHOURS	REL <sub>INT</sub>	REL <sub>EVER</sub>	REL <sub>AFF</sub>	LIB <sub>50</sub>	LIB <sub>40</sub>	LIB <sub>60</sub>
Austria	34.74	34.24	0.41	0.89	0.71	0.57	0.56	0.57
Belgium	34.80	34.61	0.27	0.56	0.38	0.65	0.61	0.66
Bulgaria	41.03	42.18	0.34	0.79	0.78	0.32	0.32	0.32
Croatia	41.40	39.74	0.53	0.84	0.79	0.29	0.28	0.30
Cyprus	39.09	36.06	0.59	0.99	0.99	0.36	0.33	0.37
Czech Republic	40.85	42.93	0.15	0.21	0.18	0.50	0.49	0.50
Denmark	35.69	35.29	0.26	0.65	0.58	0.60	0.58	0.61
Estonia	39.20	43.94	0.21	0.21	0.17	0.39	0.37	0.40
Finland	38.45	37.08	0.35	0.68	0.58	0.57	0.56	0.57
France	34.76	36.28	0.21	0.54	0.40	0.50	0.48	0.51
Germany	35.53	33.72	0.28	0.65	0.52	0.58	0.57	0.59
Greece	41.19	38.99	0.58	0.93	0.92	0.42	0.40	0.43
Hungary	39.69	44.41	0.30	0.61	0.54	0.58	0.57	0.58
Iceland	38.70	36.58	0.38	0.60	0.46	0.53	0.51	0.54
Ireland	36.27	32.63	0.55	0.91	0.81	0.20	0.18	0.22
Israel	38.35	36.86	0.43	0.95	0.94	0.30	0.29	0.31
Italy	38.97	.	0.51	0.81	0.76	0.41	0.40	0.42
Latvia	39.12	.	0.29	0.47	0.43	0.37	0.35	0.38
Lithuania	38.67	40.14	0.39	0.86	0.83	0.37	0.35	0.38
Luxembourg	37.24	34.21	0.31	0.85	0.74	0.49	0.47	0.50
Netherlands	31.16	30.13	0.32	0.59	0.38	0.55	0.51	0.57
Norway	35.51	36.44	0.26	0.61	0.51	0.64	0.61	0.65
Poland	41.57	48.36	0.60	0.95	0.91	0.23	0.23	0.23
Portugal	38.22	41.06	0.47	0.90	0.83	0.41	0.38	0.42
Romania	40.86	.	0.55	0.94	0.93	0.40	0.38	0.40
Russia	40.39	39.33	0.31	0.53	0.52	0.42	0.42	0.42
Slovakia	40.42	42.74	0.47	0.81	0.75	0.42	0.40	0.43
Slovenia	40.07	39.49	0.35	0.57	0.52	0.38	0.37	0.38
Spain	38.00	35.28	0.34	0.85	0.69	0.38	0.35	0.39
Sweden	37.72	35.91	0.21	0.35	0.27	0.75	0.73	0.75
Switzerland	36.14	33.21	0.40	0.81	0.64	0.39	0.39	0.40
Turkey	47.25	41.58	0.65	0.98	0.97	0.31	0.30	0.31
Ukraine	39.77	39.42	0.44	0.73	0.71	0.37	0.36	0.37
United Kingdom	33.67	31.81	0.26	0.53	0.39	0.62	0.60	0.63
Average	37.62	37.57	0.36	0.69	0.60	0.47	0.45	0.47
Std. Dev	37.62	37.57	0.36	0.69	0.60	0.47	0.45	0.47

Table A1: SUMMARY STATISTICS

Notes. This table presents country-by-country averages of the key variables of the empirical analysis: the number of hours worked (HOURSWORKED), the desired number of hours worked (DESIREDHOURS), religious intensity and affiliation (REL<sub>INT</sub>, REL<sub>EVER</sub> and REL<sub>AFF</sub>) and the liberties variables (LIB<sub>50</sub>, LIB<sub>40</sub> and LIB<sub>60</sub>). See Appendix A for definitions.

above-defined indicators for each country and year. We have also used principal components to aggregate the indices and the results were virtually identical.

### A.3 Summary Statistics

Tables A1 and A2 present summary statistics of the variables employed in the empirical analysis. Table A1 presents country-by-country averages of the key variables in our empirical analysis: effort, religiosity and the liberties. Table A2 presents more statistics related to all the variables considered in the empirical section.

variable	Obs.	Mean	Std. Dev.	Min	Max
HOURSWORKED	145492	40.79	12.63	1.00	100.00
CONTRACTHOURS	145723	37.62	10.47	1.00	100.00
DESIREDHOURS	48498	37.57	11.62	1.00	150.00
REL <sub>INT</sub>	167583	0.36	0.27	0.00	1.00
REL <sub>AFF</sub>	165495	0.60	0.49	0.00	1.00
REL <sub>EVER</sub>	165699	0.69	0.46	0.00	1.00
REL <sub>INT</sub> <sup>IV</sup>	154357	0.36	0.16	0.00	0.94
LIB <sub>40</sub>	167818	0.45	0.17	0.00	1.00
LIB <sub>50</sub>	167818	0.47	0.16	0.00	1.00
LIB <sub>60</sub>	167818	0.47	0.16	0.00	1.00
AGE	165684	42.63	13.19	19.00	100
GENDER	167651	0.54	0.50	0.00	1.00
COHAB	166682	1.32	0.47	1.00	2.00
CHILDREN	167235	0.51	0.50	0.00	1.00
EDUYRS	166297	12.73	3.93	0.00	56.00
HHSIZE	167691	3.00	1.50	1.00	77.00
HEALTH	167651	2.07	0.83	1.00	9.00
EDU-PTNR	112238	3.25	1.63	0.00	55.00
VALUE-LEISURE	160248	4.11	1.30	1.00	6.00
VALUE-CONSUMPTION	161072	3.06	1.34	1.00	6.00
GAYRIGHTS	161569	2.20	1.16	1.00	5.00
DIVORCE	27501	2.58	1.14	1.00	5.00
WOMEN-LESSRIGHT	56470	3.13	1.16	1.00	5.00
WOMEN-DROPJOB	27847	2.59	1.23	1.00	5.00
CONSERVATISM	25181	2.73	0.77	1.00	5.00
TRADITIONALISM	160926	4.25	1.33	1.00	6.00

Table A2: SUMMARY STATISTICS

Notes. This table presents summary statistics for the variables considered in the empirical analysis, see Appendix A for definitions.

## B Appendix: Additional results

Appendix B contains additional results not included in the main text. Section B.1 considers a particular example of utility function that yields a specification similar to the one employed in the empirical analysis. Sections B.2 and B.3 present further robustness checks.

### B.1 An example of a utility function generating a linear specification

For the sake of simplicity, in our empirical analysis we've used a linear specification to test the implications of Proposition 1. To provide further intuition on the type of preferences that generate a linear relationship between the key variables of interest, consider the following specification,

$$u(c, \Lambda_i, l) = c \left[ 1 + \Lambda_i \right] - \frac{1}{2} e^2.$$

Since leisure is additively separable from liberties and consumption, this specification of the preferences satisfies the conditions of Proposition 1. To simplify further the empirical specification, we assume that  $\alpha_R=1$  and  $\alpha_S=0$ . This is a particular way of capturing the fact that the externality effect is likely to be larger for religious than for secular. Secular are favourable to liberties because they will make use of them and hence do not need to attach a huge value to the externality of the legal cap as such. In contrast, although religious individuals are free not to use whatever liberties are afforded, they are often intensely engaged in active [sometimes even violent] lobbying against such liberties. This can only be rationalised by a very large weight on the externality effect of the legal cap on liberties. This assumption implies that  $\Lambda_i = (\bar{x} - x)\ell$ , the same expression for religious or secular (but with different signs), obviously depending on  $x$ .

Under these assumptions, it is easy to show that optimal effort is given by

$$e = w[1 + (\bar{x} - x)\ell].$$

Taking logs and using the approximation  $\log(1 + (\bar{x} - x)\ell) \approx (\bar{x} - x)\ell$ , which is valid if  $x$  is in a neighbourhood of  $\bar{x}$ , it follows that<sup>27</sup>

$$\log(e) = \log(w) + \bar{x}\ell - x\ell. \tag{5}$$

Expression (5) establishes a linear relationship between (the log of) effort, liberties and the interaction of religiosity and liberties. This equation is very similar to the ones we've estimated in our empirical analysis, with the exception that the dependent variable is in logs. Using effort in levels or in logs is conceptually very similar. We've reestimated our regressions using effort in logs, obtaining identical conclusions as in our main analysis.<sup>28</sup>

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<sup>27</sup>Since the range where  $x$  moves is arbitrary it is possible to renormalise it so that this approximation can be applied.

<sup>28</sup>For the sake of brevity, we don't report these results but they are available upon request.

	[1]	[2]	[3]	[4]	[5]	[6]
RELEVER	1.180*** (0.008)	1.123** (0.041)	1.137* (0.075)	0.750 (0.470)	0.387 (0.574)	1.025 (0.115)
LIB40	2.074 (0.164)	6.364*** (0.002)	5.037** (0.045)	11.202*** (0.000)	-0.480 (0.813)	1.767 (0.495)
RELEVER × LIB40	-2.608** (0.012)	-3.143*** (0.007)	-3.263** (0.040)	-3.175 (0.123)	-0.550 (0.635)	-2.273* (0.060)
AGE <sup>2</sup>	-0.002** (0.050)	-0.003*** (0.007)	0.001 (0.463)	-0.003*** (0.008)	-0.004*** (0.000)	-0.002** (0.043)
AGE	0.119* (0.082)	0.183** (0.031)	-0.049 (0.522)	0.202** (0.016)	0.330*** (0.000)	0.129 (0.192)
GENDER	-7.725*** (0.000)	-7.509*** (0.000)				
CHILDREN	-0.552** (0.029)	-1.176*** (0.000)	-1.029*** (0.009)	-1.869*** (0.000)	0.009 (0.962)	-0.260 (0.349)
EDUYRS	0.064 (0.257)	-0.014 (0.692)	0.118* (0.096)	0.061 (0.247)	-0.041 (0.318)	-0.139*** (0.000)
HHSIZE	-0.076 (0.484)	-0.102 (0.280)	-0.391*** (0.008)	-0.441*** (0.001)	0.253** (0.023)	0.238** (0.024)
HEALTH	-0.009 (0.932)	-0.196* (0.072)	0.024 (0.852)	-0.143 (0.383)	-0.181** (0.045)	-0.339*** (0.003)
EDU-PTNR	-0.064 (0.226)	-0.252*** (0.001)	0.019 (0.721)	-0.195* (0.052)	-0.003 (0.960)	-0.152*** (0.005)
c	40.906*** (0.000)	38.579*** (0.000)	37.578*** (0.000)	29.796*** (0.000)	35.271*** (0.000)	40.519*** (0.000)
Dep. var.	HOURSWORKED	DESIREDHOURS	HOURSWORKED	DESIREDHOURS	HOURSWORKED	DESIREDHOURS
Sample	All	All	Women	Women	Men	Men
R <sup>2</sup>	0.150	0.271	0.142	0.291	0.042	0.141
Obs	95296	31127	49829	16721	45467	14406

Table A3: EFFORT, RELIGIOSITY AND LIBERTIES: (PAST) RELIGIOUS AFFILIATION

Notes. Dependent variable is HOURSWORKED (columns 1, 3 and 5) and DESIREDHOURS (columns 2, 4 and 6). Columns 3 and 4 (5 and 6) restrict the sample to women (men). All models have been estimated by OLS and contain country, survey and country-survey dummies. There are 34 countries. Robust standard errors clustered at the country level have been computed. p-values are in parentheses.

## B.2 Results using REL<sub>EVER</sub>

Table A3 replicates Table 3 in the main text using past religious affiliation (REL<sub>EVER</sub>) in place of current affiliation (REL<sub>AFF</sub>). Results are very similar as those presented in the main text, with the exception of column 4, where the sample is restricted to women and the dependent variable is DESIREDHOURS. In this case, the coefficient of the interaction of religious affiliation and liberties is less precisely estimated (p-value is .12).

## B.3 Appendix: Relaxing instrument exogeneity

In this appendix we describe our implementation of the approach proposed by Conley, Hansen and Rossi (2012), which allows to examine the robustness of 2SLS estimates to violations of the exclusion restriction. This assumption is violated whenever the instrument is correlated with the residuals, leading to a bias in the 2SLS estimator. Nevertheless, as the magnitude of this bias is inversely related to the strength of the instrument, it follows that it can be large or small, depending on the strength/weakness of the instrument. In the following we examine this issue and evaluate

the robustness of our conclusions to departures from the exclusion restriction.

Consider the following model:

$$Y = X\beta + Z\gamma + \epsilon,$$

where  $X$  is a matrix of (endogenous) regressors and  $Z$  is a matrix of instruments (uncorrelated with  $\epsilon$ ). The exclusion restriction is satisfied if  $\gamma = 0$ . Conley et al. consider violations of this assumption by allowing  $\gamma$  to follow a distribution  $F$ . Assuming that this distribution is given by  $F = N(\mu_\gamma, \Omega_\gamma)$ , it follows that

$$\hat{\beta} \sim N(\beta + A\mu_\gamma, \Omega_{2sls} + A\Omega_\gamma A'), \quad (6)$$

$$A = (X'Z(Z'Z)^{-1}Z'X)^{-1}(X'Z), \quad (7)$$

where  $N(\beta, \Omega_{2sls})$  is the usual 2SLS asymptotic distribution. Expression (6) is useful as it allows to compute valid confidence bands for  $\hat{\beta}$  when the exclusion restriction is violated. In the following, consider that  $X$  contains our potentially endogeneous regressors (i.e.,  $REL_{INT}$  and  $REL_{INT} \times LIB_{40}$ ) and  $Z$  the corresponding instruments ( $REL_{INT}^{IV}$  and  $REL_{INT}^{IV} \times LIB_{40}$ ). Values of  $\gamma$  different from zero imply that the instruments have a direct effect on the dependent variable. We assume that  $\gamma$  follows a zero-mean bivariate Normal distribution with variance-covariance matrix

$$\Sigma_\gamma = \begin{pmatrix} \delta & 0 \\ 0 & \delta \end{pmatrix}, \text{ with } \delta \geq 0.$$

By considering different values for  $\delta$  we are able to identify the threshold at which the second-stage coefficient on (instrumented)  $REL_{INT} \times LIB_{40}$  becomes insignificant at the 10% level. The higher the value of  $\delta$ , the higher the probability of observing a large direct impact of the instrument on the dependent variable is large. Figure 6 presents our results. The solid line in Figure 6 depicts the point estimate of  $\beta_2$  (the coefficient associated to  $REL_{INT} \times LIB_{40}$ ) corresponding to column 7, Table 1. The dashed lines report the confidence bounds (at the 10% confidence level) of  $\hat{\beta}_2$  computed for different values of  $\delta$ . The picture shows that increasing the value of  $\delta$  increases the width of the confidence interval of  $\hat{\beta}_2$ . Still, the estimate remains significant for considerably

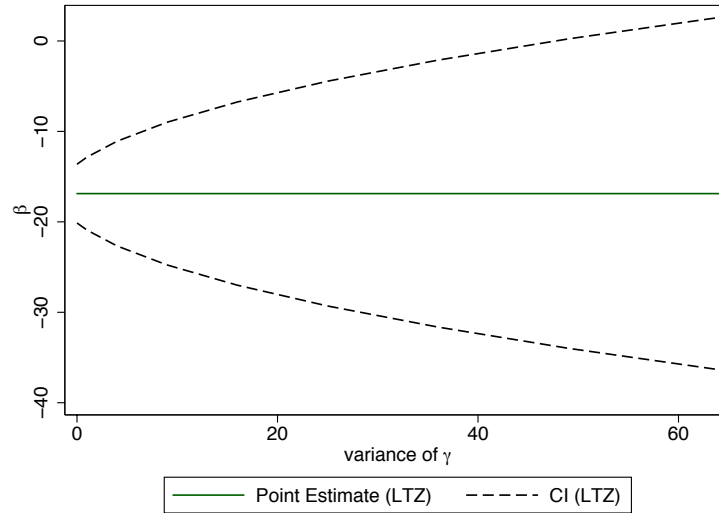


Figure 6: Relaxing the exclusion restriction

This graph depicts the confidence interval associated to  $\hat{\beta}_2$  (column 7, Table 1) for different values of  $\delta$ , the variance of  $\gamma$ , see equation (B.3). The local to zero method has been employed in the calculation, see Conley et al. (2012) for details.

large values of  $\delta$ . We identify a threshold for  $\delta$  equal to 52.3, below which our conclusions are not overturned. Given the observed size of the coefficients (recall, for instance, that the coefficient of  $\hat{\beta}_2$  is -16.9), it seems unplausible that the instrument has such a large direct impact on the dependent variable.

Summarizing, the results above imply that, given the strength of the instrument, our conclusions are very robust to moderate violations of the exclusion restriction.