Social Choice and Welfare (2019) 53:313–336
https://doi.org/10.1007/s00355-019-01185-7

ORIGINAL PAPER

Civic capital and support for the welfare state

Roy Cerqueti[1] · **Fabio Sabatini**[2,3] · **Marco Ventura**[2]

Received: 16 October 2017 / Accepted: 25 March 2019 / Published online: 1 April 2019

Abstract
We model how the interplay between tax surveillance institutions and civic capital shapes taxpayers' support for the welfare state. We show that, when tax surveillance is tight, rational civic-minded individuals express greater support for welfare spending than uncivic ones. We provide empirical evidence of these preferences using data from Italy, a country that has long posed a puzzle for public economists for its limited civic capital and large welfare state.

1 Introduction

In these times of economic crisis and public finance distress, the issue of welfare state legitimacy has become a central theme in the public debate. The size of the welfare state ultimately depends on citizens' support, which, according to standard economic reasoning, might be basically determined by self-interest. Some authors suggested that government size crucially depends on civic capital, which restrains free-rider problems and bureaucratic failures (Rothstein 2009; Bergh and Bjørnskov 2011; Bjørnskov and Svendsen 2013). In line with the literature on civic capital (e.g. Putnam et al. 1993; Antoci et al. 2012; Guiso et al. 2016),[1] Algan et al. (2016) distinguished individuals between "civic" and "uncivic" taxpayers, to show that uncivic citizens express higher support for the welfare state because they expect to benefit from it without bearing its costs. Civic-minded individuals, on the other hand, are less favourable to big-sized welfare states because they fear free-rider problems.
Algan et al.'s model helps understand how Mediterranean countries can have large welfare states despite their low levels of civic capital and trust. We add to this literature by showing that taxpayers' preference for welfare spending varies according to

[1] See Sabatini (2009) and Guiso et al. (2010) for a review of the literature.

✉ Fabio Sabatini
fabio.sabatini@uniroma1.it

[1] Department of Economics and Law, University of Macerata, Macerata, Italy

[2] Department of Economics and Law, Sapienza University of Rome, Rome, Italy

[3] IZA, Bonn, Germany

their civic-mindedness in unexpected ways also depending on institutions. When tax surveillance is perceived as tight, civic-minded taxpayers rationally express higher support for the welfare state than uncivic citizens.[2] Our model extends the framework proposed by Algan et al. (2016) by making the assumption that, when taxpayers consider whether to support higher government spending or not, they also take into account the efficiency and tightness of tax surveillance, i.e. the probability of being caught and sanctioned by enforcement institutions in case of tax evasion. As the tightness of surveillance increases, civic-minded individuals will be more confident that everyone will pay taxes and that free riding and rent seeking activities will be limited, resulting in higher support for welfare spending. On the other hand, uncivic individuals will find a large-sized welfare state less attractive. Higher levels of civic capital at the macro level strengthen the support for large welfare states in either type of individual.

We use the notion of civic capital in the sense proposed by Guiso et al. (2010, 2016) as those persistent and shared beliefs that help a group overcome the free rider problem in the pursuit of socially valuable outcomes. This form of capital has both a micro and a macro dimension. At the micro level, it takes the form of those norms that, among other things, lead the individual to behave prosocially, thereby discouraging free riding and rent seeking behaviours. At the macro level, civic capital derives from the sharing of the same norms.[3]

We then test the predictions of the model using cross-sectional micro data provided by the Bank of Italy in its Survey on Household Income and Wealth (SHIW). To operationalize the concept of civic capital in the empirical analysis we follow Guiso et al. (2010, 2016) and use indicators of the extent to which individuals dislike actions of free riding and rent seeking. To provide consistent estimates despite the endogeneity of individuals' civic-mindedness we use a procedure proposed by Wooldridge (2002). This approach serves to cope with the absence of traditional identifying information by exploiting instruments derived from a nonlinear first-stage. We are aware this identification strategy is not as straightforward and transparent as a random natural experiment. However, it is anyway preferable to a basic OLS-based approach as it shares with experiment-based IV strategies the same estimator, which is proved to be consistent, implying that, given the validity of instruments, the two procedures at least provide the same result in large samples (Wooldridge 2002).

The main conclusions of the empirical analysis are derived from the coefficient of the interacted term between taxpayers' civic capital and their perception of the probability of being caught and sanctioned in case of tax evasion, which we use as a proxy for the tightness of tax surveillance. The empirical analysis shows that civic-minded individuals are significantly less likely to support the welfare state. Interacting our indicator of

[2] Hereafter, we will use civic and civic-minded as synonyms for sake of readability.

[3] There may be doubt whether social capital—and civic capital, in particular—is an individual or a collective construct. In the sociological literature, it is commonly agreed that it is both. According to Bourdieu (1986) and Coleman (1988), social capital is basically an individual resource. The sharing of this resource, on the other hand, allows formal or informal groups of individuals to pursue shared goals. Bourdieu (1980) argues that actors might use social relations—which are often developed on the basis of a common belief—as means to increase their ability to advance personal interests and improve well-being. Coleman (1988) considers social capital as a resource that, while inherent in the structure of relations between actors, basically serves to "facilitate certain actions of actors, whether persons or corporate actors, within the structure" (p. 98). Reviews of these aspects of social capital can be found in Coleman (1990), Fine (2001), Sabatini (2007).

civic capital with the tightness of tax surveillance, however, reveals that when surveillance is regarded as tight, civic-minded individuals manifest a significantly stronger support for the welfare state in respect to uncivic ones.

These theoretical and empirical findings have important policy implications, suggesting that tightening tax surveillance could induce a more truthful revelation of the preferences of civic-minded citizens that could affect taxpayers' support for redistribution, with effects on tax morale, the outcomes of electoral competitions and, ultimately, public spending.

Our study bridges three strands of literature. The first deals generically with the economic outcomes of social capital dimensions. This body of studies empirically analyses how trust, civicness, and networks influence prosocial behavior (Sapienza et al. 2013), tax morale (Feld and Frey 2002; Frey and Torgler 2007), regulation (Aghion et al. 2010), financial development (Guiso 2004), trade (Guiso et al. 2009), and economic growth (Algan and Cahuc 2010, 2016; Bigoni et al. 2016) just to name a few.

The second strand investigates the roots of citizens' preference for redistribution in relation to self- and other-regarding motivations, such as the taxpayers' future income and mobility prospects, the perceived equality of opportunities, and feelings of social rivalry (e.g. Meltzer and Richard 1981; Piketty 1995; Bénabou and Ok 2001; Fong 2011; Corneo and Gruner 2002). The third strand of the literature studies the determinants of the size of the welfare state. Overall, this body of research suggests that trust could reinforce the welfare state because trusting taxpayers may be less concerned with the free riding problem intrinsically connected with universal and simple access to public goods and services (Rothstein 2002; Bergh and Bjørnskov 2011; Bjørnskov and Svendsen 2013; Daniele and Geys 2015). Algan et al. (2016) remarkably innovated this literature revealing the twin peaks relationship between the country's level of trust and the size of the welfare state and explaining it as a consequence of dishonest citizens' stronger preference for redistribution.

We add to these fields of studies in substantive ways. We provide an empirically testable prediction of how surveillance institutions interact with civic capital in determining taxpayers' support for the welfare state. In testing the predictions of the model, we differentiate from previous literature by using a rich dataset from Italy—a country that has long posed a puzzle for public economists for its limited civic capital and large welfare state. More specifically, we exploit detailed information on taxpayers' opinions about the hypothetical role and the preferred extension of welfare state schemes (such as those related to healthcare and pensions) and about their perception of the efficiency of tax enforcement institutions, which was not accounted for in previous empirical studies. We also try to go beyond the basic OLS-based approach by implementing a procedure aimed to correct the endogeneity issues that usually bias the analysis of individual preferences and opinions.

The rest of the paper is organized as follows: Sect. 2 presents the model and illustrates its predictions. Section 3 is devoted to the description of our data and empirical strategy. Section 4 tests the predictions of the model at the individual level and provides an interpretation of results. Section 5 concludes.

2 Theoretical model

We start the theoretical analysis by modeling how the interplay between civic capital and surveillance institutions shapes support for the welfare state. This part of the analysis extends the model developed by Algan et al. (2016).

We consider a continuum of individuals of measure one, and partition them according to their civic-mindedness. Assume that $\alpha \in [0, 1]$ is the share of civic individuals, and the remaining $1-\alpha$ the share of uncivic ones. As in Algan et al. (2016), all individuals share the same preferences over consumption, c, and the utility function is logarithmic, i.e.: $u(c) = \log(c)$.

Each individual produces a certain amount $y > 0$ of consumption goods with probability π, and a lower level $y_0 < y$ with probability $1 - \pi$.

Those who produce amounts y_0 of consumption goods are entitled to welfare benefits. Agents producing y must pay a tax, t, to finance such benefits b. However, productive taxpayers can cheat both on taxes and on welfare benefits, by declaring a lower amount of production and then claiming welfare benefits they are not actually entitled to. Following Algan et al. (2016) we call these individuals "uncivic". Civic individuals, on the other hand, neither cheat on taxes nor claim benefits they are not entitled to: they always declare their true level of production and—when their production is y—they pay the tax t. At this point, we extend the framework of Algan et al. (2016) by making the plausible assumption that enforcement institutions not only monitor taxpayers' level of production but also have the power to inflict penalties on tax evaders.

Tax surveillance specifically concerns those who declare lower amounts of production, $y_0 < y$, and claim welfare benefits. When an inspection reveals that their true level of production is y, the surveillance institution imposes a fine M, requires the payment of the tax t, and withdraws the welfare benefits. We do not include M in the set of the decision variables as this would bias the M-dependent comparison between civic and uncivic citizens. Rather, we assume that the government sets M at the specific level that allows the amount $t+M$ payed by caught tax evaders to equal the tax harm, properly inflated for the chance of not being detected, plus the monitoring and enforcement costs, as determined in Polinsky and Shavell (1992) building on Becker (1968) and Stigler (1970). This value allows the government not only to cover the cost of surveillance but also to recover the whole amount of evaded taxes, as caught cheaters also have to pay the taxes evaded by undetected cheaters. As we explain in more detail in "Appendix A" section, this assumption allows enforcement costs not to affect the budget constraint of the government. On the other hand, selecting a priori the value of the penalty M—which can be above or below a critical threshold M^*—allows us identifying which type of agent would express a stronger support for the welfare state (see Proposition 2). The existence of surveillance institutions is a deterrent to free riding and rent seeking behaviours. An uncivic individual declares y_0 (i.e. the lower level of production) and claims benefits she is not entitled to with a positive probability $1 - p$. The probability of an inspection is $1 - q$, and the inspection entails a final payoff for the uncivic individuals of $y - t - M$, while the uncivic individual who is not subject to inspection obtains $y + b$.

We first analyse the optimal support for the welfare state from civic and uncivic individuals.

Following Algan et al. (2016), we write the budget constraint of the government[4] as follows:

$$\pi t[\alpha + p(1-\alpha)] = [(1-\pi) + \pi(1-p)(1-\alpha)]b. \tag{1}$$

The explicit form of the expected utility U differs among civic and uncivic individuals. Taxpayers rationally choose the tax and the benefits that maximize their utility: $U = U(t, b)$. Specifically, we have:

$$U(t,b) = \begin{cases} U_{civic}(t,b), & \text{for civic individuals;} \\ U_{uncivic}(t,b), & \text{for uncivic individuals,} \end{cases} \tag{2}$$

where

$$U_{civic}(t,b) = \pi \log(y-t) + (1-\pi)\log(y_0+b) \tag{3}$$

and

$$\begin{aligned} U_{uncivic}(t,b) = \pi \big[& p\log(y-t) + (1-p)q\log(y+b) \\ & + (1-p)(1-q)\log(y-t-M)\big] + (1-\pi)\log(y_0+b). \end{aligned} \tag{4}$$

It is important to note that the deterrent provided by enforcement institutions only affects the utility of uncivic individuals, as civic-minded ones will refrain to cheat on taxes and benefits anyway. The optimization problem for the individual then is

$$\max_{t,b} U(t,b) \tag{5}$$

with the budget constraint (1), being $U(t, b)$ defined as in (3) (civic individuals) or as in (4) (uncivic individuals).

The optimal parameters t and b will be denoted by t_{civic} and b_{civic} in the civic case and $t_{uncivic}$ and $b_{uncivic}$ in the uncivic one. The detailed steps of the solution of the model are presented in "Appendix B".

As suggested in Algan et al. (2016), the support for the welfare state can intuitively be captured by the ratio of consumption of unproductive individuals, $y_0 + b$, over consumption of productive individuals, $y - t$, where t and b are the ones chosen by civic and uncivic individuals. Such a ratio will be denoted by ρ. As ρ increases, agents want more welfare spending.

We discuss separately the cases.

[4] Further discussions on the budget constraint will be given in "Appendix A".

2.1 Civic individuals

Formally, we have:

$$\rho_{civic} := \frac{y_0 + b_{civic}}{y - t_{civic}} = \frac{[\alpha + p(1-\alpha)](1-\pi)}{1 - \pi + \pi(1-p)(1-\alpha)}, \tag{6}$$

being the second equality obtained by substituting the values t_{civic} and b_{civic} (see "Appendix B") in the definition of ρ.
To emphasize the role of civic capital in determining individuals' support for the welfare state we consider the dependence of ρ on α and write ρ_{civic} as $\rho_{civic} = \rho_{civic}(\alpha)$, where α is the share of civic-minded individuals in the population of taxpayers.

The following result holds true:

Proposition 1 *It is* $\rho'_{civic}(\alpha) \geq 0$, *for each* $\alpha \in [0, 1]$.

Proof A straightforward computation gives

$$\rho'_{civic}(\alpha) = \frac{(1-\pi)\{1 - \pi + \pi(1-p)[1 + p(1-\alpha)]\}}{[1 - \pi + \pi(1-p)(1-\alpha)]^2}, \tag{7}$$

and the sign of the right-hand side of (7) is positive. □

We notice that $\pi \neq 1$ leads to $\rho'_{civic}(\alpha) > 0$, while when $\pi = 1$, then $\rho'_{civic}(\alpha) = 0$. This means that, if everybody is "rich" ($\pi = 1$), then an increase in the share of civic individuals is not accompanied by any increase in support for the welfare state (as nobody benefits from it). However, when there are less productive individuals in society—i.e. people who will benefit from redistribution—the higher the share of civic individuals, the stronger the support for the welfare state from civic-minded individuals. Civic individuals, in fact, will be less concerned with the possible free riding and rent seeking activities by uncivic fellow citizens. In addition, as the share of civic individuals in the population grows, the probability that public officials are corrupt decreases. This prediction is consistent with Algan et al. (2016) and, more in general, with the insights provided by the literature on trust and welfare state, which suggests that the size of the welfare state and citizens' support for it are positively associated with the share of the population that can be trusted (e.g. Kumlin and Rothstein 2005; Bergh and Bjørnskov 2011).

2.2 Uncivic individuals

The explicit form of $t_{uncivic}$ and $b_{uncivic}$ are not needed here. In fact, by the first and second equation of (21), we can directly write the ratio between benefits and taxes, in order to analyse the support of individuals for the welfare state. We obtain:

$$\rho_{uncivic} := \frac{y_0 + b_{uncivic}}{y - t_{uncivic}}$$

$$= \frac{\rho_{civic}}{p} \cdot \left(\frac{\pi(1-p)q(y_0 + b_{uncivic})}{(1-\pi)(y + b_{uncivic})} + 1 \right) - \frac{(1-p)(1-q)(y_0 + b_{uncivic})}{p(y - M - t_{uncivic})}. \quad (8)$$

We show that, if the fine is high enough, then support for the welfare state is stronger in civic individuals than in uncivic ones. This claim is proved in the following:

Proposition 2 *Assume that*

$$M > M^* := y - t_{uncivic} - \frac{(1-\pi)(1-p)(1-q)(y_0 + b_{uncivic})(y + b_{uncivic})}{\rho_{civic}\left[\pi q(1-p)(y_0 + b_{uncivic}) + (1-\pi)(y + b_{uncivic})\right]}. \quad (9)$$

Then $\rho_{uncivic}(\alpha) < \rho_{civic}(\alpha)$, *for each* $\alpha \in [0, 1]$.

Proof The proof is a direct consequence of formula (8). □

Proposition 2 deepens the result obtained by Algan et al. (2016), namely that uncivic individuals support the welfare state more than their civic-minded fellow citizens. In fact, if we make the plausible assumption that surveillance institutions can inflict penalties, uncivic individuals will take into account the deterrent of the penalty in their optimization problem. As a result, civic individuals will demand more welfare than uncivic ones.

More specifically, civic individuals will be more confident that antisocial behaviours will be not only detected but also properly punished by enforcement institutions. On the other hand, dishonest citizens will find extensive and universal welfare programs less attractive, in addition to fearing the prospect of paying both a fine and the due taxes. As expected, support for the welfare state increases in both civic and uncivic citizens with the share of civic individuals.

2.2.1 A remark on uncivic individuals when there is no punishment for tax evasion

In this case there is no punishment for tax frauds and we fall in the framework of Algan et al. (2016), where $M = 0$ (and condition (9) does not hold).

The formal proof of this outcome, is presented in "Appendix C".

3 Empirical evidence

In this section, we test the predictions of the model at the individual level. Summarizing, the model predicts that: (i) if institutions can inflict penalities, civic individuals display higher support for the welfare state than uncivic ones; (ii) when penalties are removed, the opposite of prediction (i) holds true and uncivic individuals show higher support for the welfare state. To test these predictions, we use Two-Stage Least Squares, TSLS, where the dependent variable is an indicator of individuals' support for the welfare state, and the main explanatory variables are individual civic capital

and its interaction with the perceived tightness of tax surveillance. Both the two main explanatory variables are instrumented with the fitted probability from two nonlinear first-stages, one each, which provide us with consistent estimates, as explained in Wooldridge (2002). Our data and empirical strategy are described in detail in the following subsections.

3.1 Data

The data are taken from the 2004 wave of the SHIW, which is conducted every 2 years by the Bank of Italy. The sample includes about 8000 households and is representative of the Italian population at the national and regional level (Bank of Italy, 2010).[5] The sample was drawn in two stages (municipalities and households), with the stratification of the primary sampling units (municipalities) by region and demographic size. Within each stratum, the municipalities in which interviews would be conducted were selected to include all those with a population of more than 40,000 inhabitants (self-representing municipalities), while the smaller towns were selected on the basis of probability proportional to size (Bank of Italy 2006). The individual households to be interviewed were then selected randomly. In the 2004 wave of the survey, a special section on "public spirit and taxation" was included in the questionnaire, in which respondents were asked to give their opinions on the tax system. We measure support for the welfare state using the following question: "Considering the Government's need to guarantee public services, please say which statement is closest to your own opinion: (please give only one answer): (i) The Government's duty is to provide all citizens with as many public services as possible (e.g. school, healthcare, pensions, etc.) even if it means heavy taxes. (ii) The Government has some unavoidable expenses for social welfare, which should be covered by taxes and duties, increasing these as and when necessary. (iii) Taxation is too high, so if there is not enough money, expenses should be reduced by cutting back services. (iv) The Government should raise the bare minimum in taxes and duties to cover absolutely essential public services (e.g. defense, justice, the police, etc.) and leave the rest to private initiative". Our indicator of support for the welfare state is given by a binary variable which takes value 1 if the respondent's opinion is closest to statement (i) or (ii) and 0 otherwise. This variable is similar to the indicators commonly used by the literature to measure the individual support for redistribution (e.g. Fong 2011; Alesina and La Ferrara 2005; Guiso et al. 2006; Algan et al. 2016). Algan et al. (2016), for example, measure support for the welfare state through the score given by respondents to the following statement: "Incomes should be made more equal" versus "We need larger income differences as incentives" in the World Values Survey (WVS), which specifically refers to respondents' preference for redistribution.[6] Guiso et al. (2006) measure support for redistribution through the 7-points score given by WVS respondents to the statement: "Some people think the

[5] SHIW data can be downloaded from the Bank of Italy's website at the url: http://bit.ly/shiw2004.

[6] More specifically, the WVS requires respondents to give a 10 points score to their opinion, where 10 means they agree completely with the statement on the right. Algan et al. (2016) employ a different dependent variable, relying on a more specific question regarding support for the welfare state, in a separate regression exploring the role of perceived trustworthiness.

government in Washington ought to reduce the income differences between the rich and the poor, perhaps by raising the taxes of wealthy families or by giving income assistance to the poor. Others think that the government should not concern itself with reducing this income differences". Alesina and La Ferrara (2005) measure the optimal size of redistributive schemes preferred by rational taxpayers through the score given by General Social Survey respondents to the statement: "Should the government reduce income differences between rich and poor?". In respect to these measures, our indicator of support for the welfare state is slightly refined as it explicitly asks respondents to focus on government spending for social welfare. As in Algan et al. (2016), higher levels of preferred spending are related to higher ratios of the consumption of unproductive individuals, $y_0 + b$, over the consumption of productive individuals, $y - t$ preferred by civic and uncivic individuals (see Eqs. 6, 8).

To measure civic capital, similarly to Algan et al. (2016), we follow Guiso et al. (2010) and focus on those values that induce people to dislike actions aimed at obtaining private benefits at high social costs. "For instance, people's opinions about cheating on taxes, free riding on public goods, cutting in line, littering and similar behaviours can all be good indicators of the prevalence of norms of morality and thus of people's willingness to internalize the public good. The common features across all these measure is that they are value judgments on activities that result in the appropriation of (possibly limited) private benefits at the expense of (possibly much larger) costs imposed on other members of society" (p. 17). Guiso et al. (2010) suggest using questions like those reported in the WVS about the perceived justifiability of free riding and rent seeking behaviors such as avoiding a fare on public transport and cheating on taxes whenever possible. In this paper we use responses to the question: "Which of the following situations do you think are always justifiable, never justifiable, or justifiable to some extent? Please give your answer on a scale from 1 to 10, 1 being "never justifiable" and 10 being "always justifiable", and the numbers in between indicating various degrees of agreement. (i) Not paying for your ticket on public transport. (ii) Keeping money you obtained by accident when it would be possible to return it to the rightful owner (for example, if you found a wallet with the owner's name and address, or if you were given too much change at the supermarket check-out). (iii) Not leaving your name for the owner of a car you accidentally scraped while parking. Therefore, such a structure of the responses captures higher civicness for lower values of the response. In order to have higher values representing higher civicness we have inverted the answers scale. Our indicator of civic capital is the mean of the (inverted) scores given by respondents to the three statements.

As in Algan et al. (2016), this indicator is appropriate for testing the relationships described in Eqs. 6 and 8 in that it allows to detect how support for the welfare state varies in relation to changes in the civic-mindedness of individuals. The aspect of tax surveillance that matters in determining agents' optimal taxes and benefits is the perceived tightness of enforcement institutions, which in the model is expressed by the penalty, M, inflicted to tax evaders and by the probability of tax inspection, $1 - q$. Given the definition of M^* in Proposition 2, we have that an increase in $1 - q$ lowers the threshold M^* above which agents internalize the penalty, M, possibly inflicted by surveillance institutions in their optimization problem, thereby making uncivic individuals demanding less welfare and civic individuals supporting more redistribution.

Table 1 Descriptive stats

	Mean	Std. Dev.
Support for welfare	0.719	0.450
Civicness	8.762	1.819
Pr of fine	2.714	0.894
Gender	0.470	0.499
Married	0.589	0.492
Single	0.244	0.430
Separated	0.0379	0.191
Age	50.60	20.51
Primary school	0.259	0.438
Middle school	0.266	0.442
Vocational secondary school	0.0578	0.233
High school	0.223	0.416
University diploma	0.00816	0.0900
Bachelor degree	0.0741	0.262
Postgraduate	0.00241	0.0491
Househ. size	2.959	1.299
Income (thousands)	33.40	29.98
Employed	0.328	0.470
Self-employed	0.0823	0.275
Unemployed	0.0545	0.227
Fairness	3.751	0.728
Tax evasion	4.056	0.835
Observations	8703	

Therefore, Proposition 2 implicitly allows using the probability of inspection, instead of M^*, for discussing the implications of the model. To measure this perception we use the question: "In your opinion, what are the chances of someone being picked for a tax inspection?" on a five points scale, where 1 means "Very high" and 5 means "Practically non-existent". In this case too, the scale has been inverted in order to have increasing values measuring higher probabilities of being caught.

In all the specifications we included controls for gender, age, household size, household income, work status and we accounted for regional effects, education and civil status. Descriptive statistics are reported in Table 1. The mean value of 0.719 indicates that support for the welfare state is relatively strong in the sample. Income distribution is asymmetric and positively skewed, as the median value is lower than the mean. This is consistent with the empirical distribution of national households' income, as reported by the official statistics for Italy (see Istat 2008).

3.2 Empirical strategy

From an empirical point of view, answering the question whether civic individuals have a greater or lower support for the welfare state, as compared to uncivic ones, is a difficult task for a number of reasons. First, there are obvious endogeneity problems, as both civicness and support for the welfare state may be driven by common unobservable attitudes such as altruism. Other-regarding attitudes, for example, can codetermine both civic-mindedness and support for the welfare state; this kind of endogeneity causes a positive bias in a simple OLS regression. On the other hand, it may be impossible to find appropriate instruments for civicness in survey data. A further complication is caused by the fact that both individuals' support for the welfare state and their civicness are measured by categorical variables.
To obtain consistent estimates despite these issues, we followed procedure 18.1 of (Wooldridge 2002), which consists of three steps:

(a) Let us denote the latent individual degree of civicness as ω^* taking values in $(-\infty; \infty)$. The observable variable we use to measure ω^* is ω, which takes $J - 1 = 10$ possible values. The latent variable can be modeled as:

$$\omega^* = \beta' x + \varepsilon$$

We observe $\omega = j$ if $\tau_{j-1} \leq \omega^* \leq \tau_j$, for $j = 1, \ldots, J - 1$, and we assume $\tau_0 = -\infty$ and $\tau_j = \infty$. Thus, the probability of $\tau_{j-1} \leq \omega^* \leq \tau_j$ is equal to the probability of $\omega = j$ and can be modeled as:

$$P(\omega = j|x) = \Phi\left(\tau_j - \beta' x\right) - \Phi\left(\tau_{j-1} - \beta' x\right)$$

Where $\Phi(.)$ is the cumulative normal density function of ε. The cut points τ_j and the coefficient vector β can be estimated by maximum likelihood, specifically by an ordered probit model regressing ω on some covariates x.

(b) Work out the fitted probabilities of the ordered probit model, $\hat{P}$, as:

$$\hat{P}(\omega = j|x) = \Phi\left(\hat{\tau}_j - \hat{\beta}' x\right) - \Phi\left(\hat{\tau}_{j-1} - \hat{\beta}' x\right) \tag{10}$$

(c) Carry out a linear TSLS of the support for the welfare state on ω and x, using $\hat{P}_i$ as instrument. That is, apply a TSLS estimator to the following regression equation:

$$support = \gamma' x + \lambda\omega + u \tag{11}$$

with $\hat{P}_i$'s as instrument(s). In cases in which there are more than one endogenous variable, let us say ω_1 and ω_2, points (a), (b) must be repeated twice and the generated $\hat{P}_i$ used together in point (c). The intuition underpinning this procedure, commonly referred to as probit-TSLS, lies in the fact that $\hat{P}_i$ is a nonlinear function of x implying not perfect correlation with it, but it is clearly correlated with ω, so that it can be used as an instrument. The validity of the instrument is not affected by possible

misspecification errors made in point (a), namely in the specification of the ordered probit model.

Steps (a)–(c) are implemented in Stata by the `ivtreatreg`[7] command (Cerulli 2014) and recent applications can be found in Pradan and Ranjan (2016), Moldogaziev et al. (2017), Ranganathan et al. (2018), among others. We are aware that this identification strategy is not as straightforward and transparent as the exploitation of a natural experiment. However, we believe it is anyway preferable to a basic OLS approach because it uses the same estimator employed in experiment-based IV strategies, which at least has been proven to be consistent in large samples. Wooldridge (2002) showed that, given the validity of instruments, probit-TSLS and the more conventional IV strategy provide the same result in large samples.To cope with possible small sample bias, we use the Limited Information Maximum Likelihood (LIML) estimator as a correction mechanism in robustness checks. LIML, in fact, has the same large sample distribution as TSLS, but provides finite sample bias reduction.

Since civicness is endogenous any interaction of this variable with others raises problems of endogeneity, for this reason we instrumented both civicness and the interaction term between civicness and the perceived probability of being caught.

The categorical nature of our variables of interest, both dependent and independent, deserves further attention. As far as the dependent is concerned, y, when the regression equation has a limited dependent variable (LDV) nonlinear models like logit or probit are invoked. In the past, some authors had recommended accounting for the categorical nature of the dependent variable in the specification of the models in the two stages (e.g. Amemiya 1978; Blundell and Smith 1989; Newey 1987; Rivers and Vuong 1988). However, the seminal work of Angrist (2001) showed that difficulties with LDV models are usually more apparent than real, as the relationship between w and y can be consistently estimated by means of a linear TSLS. Furthermore, when an independent endogenous variable, w, measured by a discrete indicator is also considered, Angrist's claim still holds true. In fact, the prediction of a nonlinear first-stage can produce inconsistent IV estimates if the model is not correctly specified, as only the OLS estimation of the first-stage is guaranteed to produce first-stage residuals that are uncorrelated with fitted values and covariates. It follows that a nonlinear first-stage is not necessary, or even not desirable, to the point that some authors refer to it as the "forbidden regression" (Angrist and Pischke 2009, 143).

3.3 Results

Table 2 reports the results of the empirical application.

Column (1) reports the OLS estimate in which civicness is treated as exogenous. In this case the estimate shows a positive relationship between *civicness* and *support* for the welfare state. This result, however, is likely to be inconsistent due to the positive bias caused by the endogeneity problems described above. To further test the endogeneity of *civicness* we performed a Durbin–Wu–Hausman test, which rejects the null of exogeneity at 1%, prompting us to turn to the TSLS estimator. As explained in Sect. 3.2, instruments are $\hat{P}_i$ taken from the ordered probit of *civicness* on the

[7] In particular, probit-TSLS and is an option of the Stata command `ivtreatreg`.

Table 2 Dependent: support for the welfare state

Variables	(1) OLS	(2) TSLS	(3) TSLS	(4) TSLS	(5) TSLS	(6) TSLS	(7) LIML
Civicness	0.0190**	−0.517**	−0.537**	−0.640***	−0.523**	−0.491**	−0.521**
	(0.00828)	(0.225)	(0.225)	(0.247)	(0.226)	(0.210)	(0.227)
Civic * pr fine	−0.00208	0.191**	0.191**	0.199**	0.193**	0.177**	0.192**
	(0.00289)	(0.0819)	(0.0812)	(0.0880)	(0.0826)	(0.0777)	(0.0828)
pr of fine	−0.0109	−1.695**	−1.700**	−1.773**	−1.713**	−1.564**	−1.708**
	(0.0262)	(0.715)	(0.708)	(0.769)	(0.721)	(0.678)	(0.723)
Gender	−0.00818	−0.0107	−0.0109	−0.0156	−0.0108	−0.0115	−0.0107
	(0.00998)	(0.0125)	(0.0125)	(0.0130)	(0.0125)	(0.0121)	(0.0125)
Age	0.00118***	0.00151***	0.00156***	0.00187***	0.00153***	0.00137***	0.00151***
	(0.000387)	(0.000514)	(0.000528)	(0.000535)	(0.000512)	(0.000480)	(0.000516)
Househ. size	−0.0126***	−0.0142**	−0.0142**	−0.0137*	−0.0139**	−0.0134**	−0.0142**
	(0.00473)	(0.00615)	(0.00625)	(0.00699)	(0.00617)	(0.00594)	(0.00617)
Income	1.28e−08	−1.15e−07	−4.68e−08	1.61e−07	−1.10e−07	−1.76e−07	−1.17e−07
	(1.95e−07)	(4.07e−07)	(4.61e−07)	(3.98e−07)	(4.07e−07)	(3.82e−07)	(4.10e−07)
Employed	0.0221	0.0123	0.00959		0.0121	0.0148	0.0123
	(0.0138)	(0.0193)	(0.0206)		(0.0193)	(0.0183)	(0.0194)
Self empl.	−0.0464**	−0.0569**	−0.0560**		−0.0571**	−0.0404	−0.0570**
	(0.0211)	(0.0258)	(0.0258)		(0.0259)	(0.0265)	(0.0258)

Table 2 continued

Variables	(1) OLS	(2) TSLS	(3) TSLS	(4) TSLS	(5) TSLS	(6) TSLS	(7) LIML
Unemployed	0.0182	0.0367	0.0307		0.0362	0.0461	0.0369
	(0.0250)	(0.0406)	(0.0445)		(0.0407)	(0.0374)	(0.0409)
Fairness					−0.00927		
					(0.0105)		
Tax evasion						0.0731**	
						(0.0306)	
Constant	0.627***	5.305***	5.483***	6.390***	5.388***	4.779***	5.337***
	(0.0838)	(1.966)	(1.962)	(2.152)	(1.971)	(1.799)	(1.985)
Observations	8,703	8,703	8,703	8,703	8,703	8,703	8,703
Hansen-(p)		0.722		0.158	0.716	0.661	0.723

Robust standard errors in parentheses, *** p <0.01, ** p <0.05, * p <0.1.
Additional controls: regional dummies, education, civil status

Table 3 First stages

Variables	(1) civicm	(2) civm_pr
$\hat{P}_{1,1}$	245.4***	581.5**
	(83.80)	(279.9)
$\hat{P}_{1,2}$	−317.9***	−811.5**
	(100.2)	(331.7)
$\hat{P}_{2,1}$	−731.2***	−1,544**
	(222.6)	(662.7)
Observations	8703	8703
F-stat	39.87	510.1

Robust standard errors in parentheses, ***p <0.01, **p <0.05, *p <0.1

The Table reports the correlation between each endogenous variable and its instrument(s). Columns indicate the instrumented variable and the rows indicate the instruments. $\hat{P}_{1,1}$ ($\hat{P}_{1,2}$) first (second) instrument for *civicness*; $\hat{P}_{2,1}$ instrument for *civic* * *pr fine*. Other covariates included as in Table 2

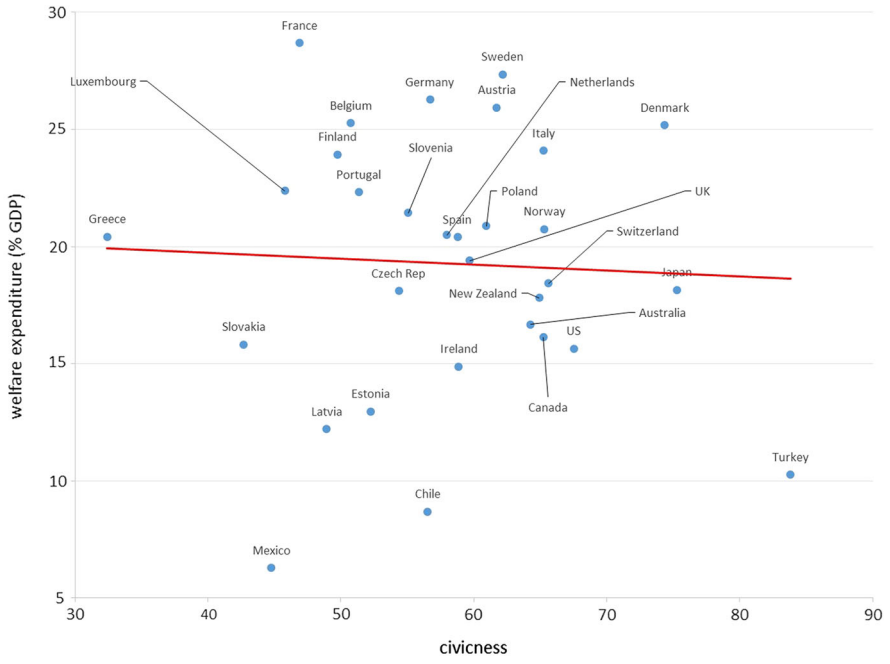
other covariates, and from the ordered probit of the interaction of *civicness* with the perceived probability of an audit. More specifically, as *civicness* takes on ten classes we can have up to nine potential instruments for *civicness* and a similar reasoning applies to its interaction with the probability of an audit. In the estimate reported in column (2), our benchmark, we have used the first two $\hat{P}_i$'s from (10) of *civicness* to instrument *civicness* and the first $\hat{P}_i$, from (10) to instrument the interaction. The TSLS estimator is conceived so that in its first stage the two endogenous variables are regressed on x plus the instruments, one at a time, so that we have two first stages, one for each endogenous variable. What is relevant here is the presence of a significant correlation between the endogenous variable and its instrument(s). Table 3 witnesses this correlation, at 1% and 5% for civicness and its interaction, respectively.

We have chosen to keep the number of instruments at a minimum in order to perform a test of the validity of the instruments, i.e. Hansen J, without weakening its power, on this point see Roodman (2009). The Hansen J statistic (see Table 2) does not reject the null of the validity (p-value 0.722). Diagnostics of underidentification and weak identification have also been performed for each endogenous regressor separately, using the method described by Angrist and Pischke (2009, 217–218). In this case we cannot accept the null of underidentification and weak identification at 1%, thus supporting the consistency of the estimated coefficients. Yet, the LIML estimation is used to correct for small sample bias and it shows virtually no differences with respect to the benchmark. Column (2) reports the equivalent specification of the OLS performed with TSLS. Once endogeneity is accounted for, the variables of interest flip sign; *civicness* is now negatively and significantly correlated with *support* for the welfare state, consistently with Algan et al. (2016). This suggests that civic-minded individuals want less extensive welfare programs, probably because they are concerned with the free riding and rent seeking activities possibly carried out by fellow taxpayers. Uncivic individuals, on the other hand, express a higher support for the welfare state,

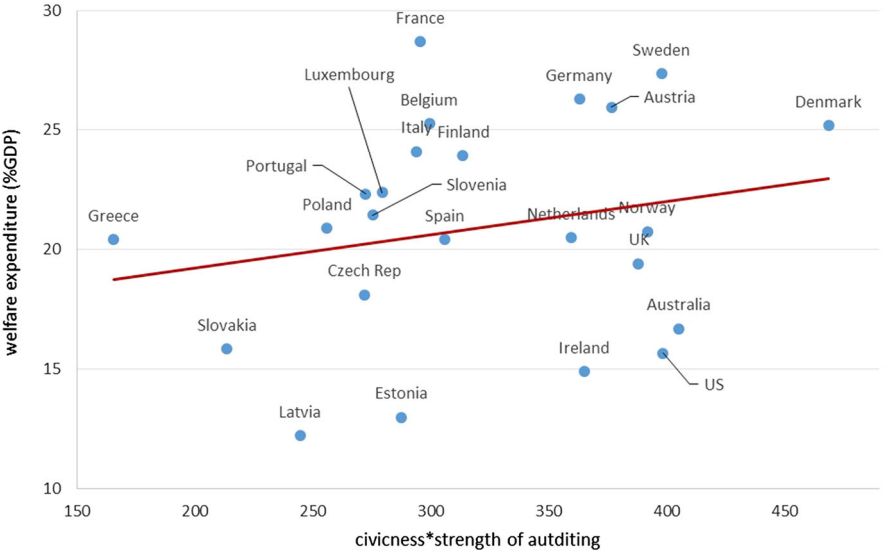
probably because they are less concerned with the higher taxes needed to fund welfare schemes and because they hope to extract rents from them. The difference between OLS and TSLS may be read in the light of the presence of a large and positive bias in an OLS estimate, for the reasons put forth in Sect. 3.2.

The interaction term between civicness and the perceived probability of being caught in case of tax evasion, on the other hand, is significantly positive. This suggests that once civic and uncivic individuals confront themselves with the possibility of being punished by surveillance institutions that can perform tax inspections, we observe a shift in their support for the welfare state. This may be explained by the fact that civic individuals are now more confident that free riding and rent seeking activities will be monitored and properly punished so, as predicted by Proposition 2, they express a higher support for the welfare state. Uncivic citizens, on the other hand, may be less confident in their ability to cheat on taxes and to obtain undue rents from public protection schemes, and therefore express lower support for welfare spending. The perceived probability that dishonest behaviors will be sanctioned, which is a proxy for the perceived tightness of surveillance institutions, has a significant and negative association with individuals' support for the welfare state. This result, which must be handled with caution due to the endogeneity issues discussed in Sect. 3.2, suggests that taxpayers actually account for enforcement institutions in the determination of their optimal taxes, and that their opinions on public spending programs are significantly affected by their perceived ability to elude taxes. The lower is the perceived efficiency and tightness of surveillance institutions, the higher may be the preference for welfare spending. This result is in line with the gist of Algan et al. (2016) arguments, to the extent that it takes into account the role of dishonesty in shaping people's support for the welfare state. As for the controls, support for the welfare state significantly increases with age. In addition to individuals' approaching retirement, this result may be related to worsening health conditions, which, unfortunately, we were unable to control for in the dataset. Self-employed workers show lower support for the welfare state. Self-employment has traditionally been associated with greater economic individualism and concomitant resistance to the welfare state. Expressions of the hostility of the self-employed to the state in general and to the welfare state in particular abound in Italy and elsewhere (see the seminal work of Wilensky (1975), and the empirical findings in Torgler 2003; Alesina and La Ferrara 2005, among others).

As a robustness check, we controlled for the possible role of respondents' beliefs regarding fairness of opportunities and self- and exogenous-determination (column 5). Fong (2011) showed that beliefs about self- and exogenous-determination are strong predictors of support for redistribution in the United States. To measure beliefs about self-determination we used responses to the following question: "Have you ever asked relatives or friends and acquaintances to help you or a member of your household find work or deal with government red tape (e.g. speed up formalities)?". We interpret the fact of relying on personal contacts, instead of personal abilities and skills, as a sign of the belief that achieving results in life partly depends on potentially exogenous factors—such as the luck of being born in the right family. In addition we controlled for an indicator of the perceived seriousness of tax evasion (column 6) by using responses to the question: "Generally speaking, among the problems facing the Government, that of tax evasion is (choose one of the following items): non existent, marginal, the same



(a) *Panel A*



(b) *Panel B*

Fig. 1 Relationship between generosity of the welfare state, civicness*strength of auditing. **a** Public social expenditure and civicness; **b** Public Social expenditure and civicness*strength of auditing. World Values Survey, OECD Social Expenditure Database. See Sect. 3.1 for the procedure used to construct civicness

as any other, serious, very serious". While the sign and significance of the estimates do not change, we interestingly observe a significant and positive correlation between the perceived seriousness of tax evasion and support for the welfare state. This result suggests that supporters of the welfare state are indeed concerned with the possibility of free-riding on taxes and rent-seeking on welfare benefits by their fellow citizens, and that tighter surveillance institutions may induce a more truthful revelation of the preferences of civic-minded individuals. As a further robustness check, we removed one instrument from the set, column (3), an operation that did not significantly affect the estimate. To further assess our results, we check their consistency with the macro evidence on the relationship between civicness and welfare spending across OECD countries. To measure civicness, we use the share of individuals declaring the following behaviors are never justifiable: "claiming government benefits to which you are not entitled", "avoiding a fare on public transport", and "cheating on taxes if you have a chance". Data are taken from the 1980–2005 waves of the World Values Survey (WVS). As in our micro-level empirical analysis, we measured civicness as the average score assigned by respondents to the previous statements, here we compute the indicator of country-level civicness as the average of the shares declaring that each of the above-mentioned behaviors is never justifiable.[8] We proxy the tightness of tax surveillance with an indicator of the "strength of auditing and reporting standards" taken from the World Competitiveness Reports prepared by the World Economic Forum. To measure welfare spending, we use the share of total public social expenditure in percentage of GDP as taken from the OECD Social Expenditure Database.[9]

Though not being statistically significant, the signs of the correlation are encouragingly consistent with the results of our micro-level analysis. As Fig. 1 shows, there is a negative cross-country correlation between the share of civic individuals and welfare spending (Panel A). However, when we interact civicness with the strength of the auditing system, the correlation turns positive, consistently with our analysis (Panel B).

4 Conclusions

In this article we have studied how civic capital shapes support for the welfare state in an environment where, following Guiso et al. (2006, 2010, 2016) and Algan et al. (2016), taxpayers are defined either as "civic" or "uncivic" based on their attitudes towards actions aimed at obtaining private benefits at a social cost. Following Algan et al. (2016), we assumed that some individuals can hide their income to free-ride on taxes and to claim welfare benefits they are not entitled to. For example, while employees whose income tax is deducted from the pay slip have no choice but declaring their

[8] The Italian Survey on Household Income and Wealth, in fact, adopts the same questions (using the same wording) used in the WVS. The two indicators of civicness we employ in the micro- and macro-level analyses are therefore decently comparable.

[9] The number of countries is unbalanced across the different waves of the WVS. We thus compute averages of civicness across 1980–2005 waves in order to have observations for the OECD countries for which we also have data about welfare spending and the strength of auditing and reporting standards (SARS). The indicator of SARS, however, was available only for 2005.

actual income, retail dealers can choose not to issue receipts in order to hide their actual revenues. This decision basically depends on the concrete possibility of hiding income and on the civic capital of individuals. We added to the literature by explicitly modelling the possibility that tax surveillance institutions can detect and punish uncivic individuals who have the possibility of hiding their income and choose to do so. In this case, rational taxpayers internalize the probability of being caught and the penalties due in case of tax evasion. Our results showed that when tax surveillance is tight, uncivic individuals support the welfare state less than their civic-minded fellow citizens. In absence of penalties for tax evasion, on the other hand, civic taxpayers want less welfare spending than uncivic ones. Of course we do not make any normative assumption equating civic-mindedness with support for big government and a welfare state. Rather, we show that the difference between civic and uncivic individuals' support for the welfare state can vary depending on the institutional context, in ways that were not previously theorized and tested in the literature. After controlling for endogeneity issues, the empirical analysis provided support for the predictions of the model. Overall, our results suggest that the efficiency of enforcement institutions might play a critical role in inducing a more truthful revelation of the preferences of taxpayers. More in general, the legitimacy and the political and financial sustainability of the welfare state could be improved through the establishment of tighter rules on tax surveillance and through long-term policies that strengthen the civic spirit of citizens.

Acknowledgements We are indebted to two anonymous reviewers whose comments led to a substantial improvement of the paper. We are grateful to Joshua D. Angrist, Maurizio Franzini, Marcella Nicolini and Marc Sangnier for helpful comments and suggestions. Usual disclaimers apply.

Appendix A: The role of enforcement costs in the budget constraint

As explained in Sect. 2, we assume that the government sets the the penalty M at the specific level allowing the amount payed by caught tax evaders (t+M) to equal the tax harm, properly inflated for the chance of not being detected, plus the enforcement costs, consistently with Polinsky and Shavell (1992). Following Polinsky and Shavell (1992), suppose for example that the probability of detecting a cheater is 50%, that the cheater evades 10,000 and that the cost of imposing a fine on a cheater is 3000. "Then the optimal fine is 23,000: 10,000 multiplied by 2, because of the 50% chance of detection, plus 3000" (Polinsky and Shavell 1992, p. 134). This value of the fine allows enforcement costs not to affect the budget constraint of the government.

If we include the penalties paid by caught tax evaders to the government's revenues and the cost of surveillance to the public expenditure, the budget constraint (1) can be rewritten as

$$\begin{aligned} &\pi t[\alpha + p(1-\alpha)] + \pi(1-\alpha)(1-p)(1-q)(t+M) \\ &\quad = [(1-\pi) + \pi(1-p)(1-\alpha)]b + \pi(1-\alpha)(1-p)t + COST, \end{aligned} \tag{12}$$

where the term $COST$ is the aggregated cost of enforcement borne by the government, $\pi(1-\alpha)(1-p)(1-q)(t+M)$ is the amount paid by the detected tax evaders and

$\pi(1-\alpha)(1-p)t$ represents the amount of taxes that were not payed by (detected and undetected) tax evaders.

If the amount of the penalty M is calibrated according to the enforcement costs and the probability of detection, then

$$\pi(1-\alpha)(1-p)(1-q)(t+M) = \pi(1-\alpha)(1-p)t + COST, \tag{13}$$

and (12) becomes (1), following the assumption that caught cheaters also have to cover the taxes not payed by undetected evaders.

In particular, (12) can be written as

$$\begin{aligned}&\pi t[\alpha + p(1-\alpha)] + \pi(1-\alpha)(1-p)(1-q)t + \pi(1-\alpha)(1-p)(1-q)M\\ &\quad = [(1-\pi) + \pi(1-p)(1-\alpha)]b + \pi(1-\alpha)(1-p)t + COST,\end{aligned}$$

so that

$$\begin{aligned}&\pi t[\alpha + p(1-\alpha)] + \pi(1-\alpha)(1-p)t - \pi(1-\alpha)(1-p)qt\\ &\quad +\pi(1-\alpha)(1-p)(1-q)M\\ &\quad = [(1-\pi) + \pi(1-p)(1-\alpha)]b + \pi(1-\alpha)(1-p)t + COST.\end{aligned} \tag{14}$$

By dropping the common terms in the left- and right-hand side of (14), one has

$$\begin{aligned}&\pi t[\alpha + p(1-\alpha)] - \pi(1-\alpha)(1-p)qt + \pi(1-\alpha)(1-p)(1-q)M\\ &\quad = [(1-\pi) + \pi(1-p)(1-\alpha)]b + COST.\end{aligned} \tag{15}$$

Formula (15) gives that condition (13) is satisfied when

$$\pi(1-\alpha)(1-p)(1-q)M = \pi(1-\alpha)(1-p)qt + COST,$$

which leads to

$$M = \frac{\pi(1-\alpha)(1-p)qt + COST}{\pi(1-\alpha)(1-p)(1-q)}. \tag{16}$$

Taking M as in (16) means that the penalty M applied to detected evaders compensates the enforcement costs and the taxes not paid by undetected evaders, as assumed in Sect. 2 consistently with Polinsky and Shavell (1992).

Appendix B: Solution of the constrained optimization problem (5)–(1)

The constrained optimization problem (5)–(1) can be solved by introducing the Lagrangian L as:

$$\begin{aligned}L(t,b,\lambda) = U(t,b) + \lambda\{&\pi t[\alpha + p(1-\alpha)]\\ &-[(1-\pi) + \pi(1-p)(1-\alpha)]b\},\end{aligned} \tag{17}$$

where λ is the Lagrange multiplier.
The first order conditions are:

$$\begin{cases} \frac{\partial L(t,b,\lambda)}{\partial t} = \frac{\partial U(t,b)}{\partial t} + \lambda\pi[\alpha + p(1-\alpha)] = 0; \\ \frac{\partial L(t,b,\lambda)}{\partial b} = \frac{\partial U(t,b)}{\partial b} - \lambda[(1-\pi) + \pi(1-p)(1-\alpha)] = 0; \\ \frac{\partial L(t,b,\lambda)}{\partial \lambda} = \pi t[\alpha + p(1-\alpha)] - [(1-\pi) + \pi(1-p)(1-\alpha)]b = 0. \end{cases} \tag{18}$$

In what follows we are going to separately analyse the two cases of civic and uncivic individuals.

Civic individuals

By (3) and (17), the system of the first order conditions in (18) becomes:

$$\begin{cases} -\frac{\pi}{y-t} + \lambda\pi[\alpha + p(1-\alpha)] = 0; \\ \frac{1-\pi}{y_0+b} - \lambda[(1-\pi) + \pi(1-p)(1-\alpha)] = 0; \\ \pi t[\alpha + p(1-\alpha)] - [(1-\pi) + \pi(1-p)(1-\alpha)]b = 0. \end{cases} \tag{19}$$

Solving system (19) allows obtaining the optimal tax as:

$$t_{civic} = (1-\pi) - \frac{[1-\pi+\pi(1-p)(1-\alpha)]y_0}{\alpha + p(1-\alpha)}, \tag{20}$$

The optimal benefit b_{civic} can immediately be derived by substituting $t = t_{civic}$ of (20) into the budget constraint—the third equation of system (19).

Uncivic individuals

Even if the explicit solution of the utility maximization problem is not needed in the uncivic individuals case, we offer the solution strategy details.
By plugging (4) into (18), we have:

$$\begin{cases} -\frac{\pi p}{y-t} - \frac{\pi(1-p)(1-q)}{y-M-t} + \lambda\pi[\alpha + p(1-\alpha)] = 0; \\ \frac{\pi(1-p)q}{y+b} + \frac{1-\pi}{y_0+b} - \lambda[(1-\pi) + \pi(1-p)(1-\alpha)] = 0; \\ \pi t[\alpha + p(1-\alpha)] - [(1-\pi) + \pi(1-p)(1-\alpha)]b = 0. \end{cases} \tag{21}$$

System (21) admits a solution, which will be denoted as $(t_{uncivic}, b_{uncivic})$, for $\lambda = \lambda_{uncivic}$.

Appendix C: The case of the model with $M = 0$

The utility can be written as follows:

$$U_{uncivic}(t,b) = \pi[p\log(y-t) + (1-p)\log(y+b)] + (1-\pi)\log(y_0+b) \tag{22}$$

By using this utility function in the optimization problem (5) with the budget constraint (1), we obtain that the first order conditions in (18) are:

$$\begin{cases} -\frac{\pi p}{y-t} + \lambda\pi[\alpha + p(1-\alpha)] = 0; \\ \frac{\pi(1-p)q}{y+b} + \frac{1-\pi}{y_0+b} - \lambda[(1-\pi) + \pi(1-p)(1-\alpha)] = 0; \\ \pi t[\alpha + p(1-\alpha)] - [(1-\pi) + \pi(1-p)(1-\alpha)]b = 0. \end{cases} \tag{23}$$

By solving system (23) we obtain

$$\rho^{(0)}_{uncivic}(\alpha) := \frac{y_0 + b^{(0)}_{uncivic}}{y - t^{(0)}_{uncivic}} = \frac{\rho_{civic}}{p} \cdot \left(\frac{\pi(1-p)(y_0 + b^{(0)}_{uncivic})}{(1-\pi)(y + b^{(0)}_{uncivic})} + 1 \right), \tag{24}$$

where the superscript (0) stands for "case with $M = 0$".
Being

$$\frac{1}{p} \cdot \left(\frac{\pi(1-p)(y_0 + b^{(0)}_{uncivic})}{(1-\pi)(y + b^{(0)}_{uncivic})} + 1 \right) > 1,$$

we obtain that $\rho^{(0)}_{uncivic}(\alpha) > \rho_{civic}(\alpha)$, for each $\alpha \in [0, 1]$. As expected, this result is in line with Algan et al. (2016).

References

Aghion P, Algan Y, Cahuc P, Shleifer A (2010) Regulation and distrust. Q J Econ 125(3):1015–1049

Alesina A, La Ferrara E (2005) Preferences for redistribution in the land of opportunities. J Public Econ 89:897–931

Algan Y, Cahuc P (2010) Inherited trust and growth. Am Econ Rev 100(5):2060–2092

Algan Y, Cahuc P (2016) Trust, growth and well-being: new evidence and policy implications. In: Durlauf SN, Aghion P (eds) Handbook of economic growth. Elsevier, Amsterdam

Algan Y, Cahuc P, Sangnier M (2016) Trust and the welfare state: the Twin peaks curve. Econ J 126(593):861–883

Amemiya T (1978) The estimation of a simultaneous equation generalized probit model. Econometrica 46:1193–1205

Angrist JD (2001) Estimation of limited dependent variable models with dummy endogenous regressors. J Bus Econ Stat 19(1):2–28

Angrist JD, Pischke JS (2009) Mostly Harmless econometrics: an Empiricist's companion. Princeton University Press, Princeton

Antoci A, Sabatini F, Sodini M (2012) The Solaria syndrome: social capital in a hypertechnological growing economy. J Econ Behav Org 81(3):802–814

Becker GS (1968) Crime and punishment: an economic approach. J Polit Econ 76:169–217

Bank of Italy (2006) Household income and wealth in (2004). Supplements to the statistical bullettin, XVI, 7. Bank of Italy, Rome

Bénabou R, Ok EA (2001) Social mobility and the demand for redistribution. Q J Econ 116(2):447–487

Bergh A, Bjørnskov C (2011) Historical levels of trust predict the current size of the welfare state. Kyklos 64(1):1–19

Bigoni M, Bortolotti S, Casari M, Gambetta D, Pancotto F (2016) Amoral familism, social capital, or trust? The behavioural foundations of the Italian North-South divide. Econ J 126(594):1318–1341

Bjørnskov C, Svendsen GT (2013) Does social trust determine the size of the welfare state? Evidence using historical identification. Public Choice 157:269–286

Blundell RW, Smith RJ (1989) Estimation in a class of simultaneous equation limited dependent variable models. Rev Econ Stud 56:37–58
Bourdieu P (1980) Le capital social. Actes de la Recherche en Sciences Sociales 31:2–3
Bourdieu P (1986) The forms of capital. In: Richardson J (ed) Handbook of theory and research for the sociology of education. Greenwood, Westport, CT
Cerulli G (2014) `ivtreatreg`: a command for fitting binary treatment models with heterogeneous response to treatment and unobservable selection. Stat J 14(3):453–480
Coleman J (1988) Social capital in the creation of human capital. Am J Soc 94:S95–S120
Coleman J (1990) Foundations of social theory. Harvard University Press, Cambridge
Corneo G, Gruner HP (2002) Individual preferences for political redistribution. J Public Econ 83:83–107
Daniele G, Geys B (2015) Interpersonal trust and welfare state support. Eur J Polit Econ 39:1–12
Fine B (2001) Social capital versus social theory. Routledge, London
Fong C (2011) Social preferences, self-interest, and the demand for redistribution. J Public Econ 82:225–246
Feld L, Frey BS (2002) Trust breeds trust: how taxpayers are treated. Econ Govern 3:87–99
Frey BS, Torgler B (2007) Tax morale and conditional cooperation. J Compar Econ 35:136–159
Guiso L, Sapienza P, Zingales L (2004) The role of social capital in financial development. Amer Econ Rev 94(3):523–576
Guiso L, Sapienza P, Zingales L (2006) Does culture affect economic outcomes? J Econ Perspect 20(2):23–48
Guiso L, Sapienza P, Zingales L (2009) Cultural biases in economic exchange. Q J Econ 124(3):1095–1131
Guiso L, Sapienza P, Zingales L (2010) Civic capital as the missing link. In: Benhabib J, Bisin A, Jackson MO (eds) Handbook of social economics. Elsevier, Amsterdam
Guiso L, Sapienza P, Zingales L (2016) Long term persistence. J Eur Econ Assoc 14–6:1401–1436
Istat (2008) Reddito e condizioni di vita. Anno 2008. https://www.istat.it/it/files//2011/02/testointegrale20091229.pdf
Kumlin S, Rothstein S (2005) Making and breaking social capital. Compar Polit Stud 38(4):339–365
Meltzer AH, Richard SF (1981) A rational theory of the size of government. J Polit Econ 89(5):914–927
Moldogaziev TT, Liu C, Luby MJ (2017) Public corruption in the U.S. States and its impact on public debt pricing. Kyklos 70(2):306–329
Newey WK (1987) Efficient estimation of limited dependent variable models with endogenous explanatory variables. J Econmetr 36:231–250
Piketty T (1995) Social mobility and redistributive politics. Q J Econ 110(3):551–584
Polinsky AM, Shavell S (1992) Enforcement costs and the optimal magnitude and probability of fines. J Law Econ 35(1):133–148
Pradan D, Ranjan R (2016) Achieving sustainability and development through collective action? An empirical analysis of the impact of the Bore Pool sharing program on farm incomes and crop choices. World Dev 88:152–174
Putnam RD, Leonardi R, Nanetti RY (1993) Making democracy work. Civic traditions in modern Italy. Princeton University Press, Princeton
Ranganathan T, Ranjan R, Pradham D (2018) Water scarcity and livelihoods in Bihar and West Bengal. India. Oxf Dev Stud 46(4):497–518
Rivers D, Vuong QH (1988) Limited information estimators and exogeneity tests for simultaneous probit models. J Econ 39:347–366
Roodman D (2009) A note on the theme of too may instruments. Oxf Bull Econ Stat 71(1):135–158
Rothstein B (2002) Sweden. Social capital in the social Democratic State. The Swedish model and civil society. In: Putnam Robert D (ed) Democracies in flux. Political culture as a condition for democracy. Oxford University Press, Oxford
Rothstein B (2009) The universal welfare state. In: Svendsen GT, Svendsen GL (eds) Handbook of social capital. The troika of sociology, political science and economics. Edward Elgar, Cheltenham
Sabatini F (2007) The empirics of social capital and economic development: a critical perspective. In: Osborne M, Sankey K, e Wilson B (eds) Social capital, lifelong learning regions and the management of place: an international perspective. Routledge, London
Sabatini F (2009) Social capital as social networks: a new framework for measurement and an empirical analysis of its determinants and consequences. J Soc Econ 38(3):429–442
Sapienza P, Toldra-Simats A, Zingales L (2013) Understanding trust. Econ J 123(573):1313–1332
Stigler GJ (1970) The optimum enforcement of laws. J Polit Econ 78:526–36
Torgler B (2003) Tax Morale, rule-governed behaviour and trust. Const Polit Econ 14:119–140

Wilensky HL (1975) The welfare state and equality: structural and ideological roots of public expenditures. University of California Press, Berkeley
Wooldridge JM (2002) Econometric analysis of cross section and panel data. MIT Press, Cambridge