Title: Trust in institutions and the profile of inequality: a worldwide perspective

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Abstract: This paper investigates the importance of accounting for the profile of inequality in the analysis of institutional trust. It sheds light on potential limitations of exploring the impact of the income distribution's shape on trust using - as traditionally done in the literature - a single inequality indicator. Using individual data from 82 countries around the world over the 1981-2021 period, results suggest that total income inequality and institutional trust are positively associated but this aggregated result hides some troubling countervailing effects. In fact, when the whole profile of inequality is considered, institutional trust appears to be significantly and negatively related to inequality between different income groups in the society - namely between the poor, the middle class, and the rich. It is instead positively associated to inequality within those income groups. Although some heterogeneities in these findings can be detected according to the country's level of development as well as according to personal characteristics related to political views, the profile of inequality does always matter. Thus, this paper indicates that limiting the analysis to one single inequality aggregator would only capture an average effect and hide a more complex underlying nexus between income distribution and institutional trust.

Key words: Institutional trust, inequality, between group inequality, within group inequality, political preferences, world.

JEL codes: D31, O15, Z13.

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1 Introduction

In recent decades, rising inequality in many countries around the world has been among the most discussed phenomena and has come at the top of researchers and policymakers' agendas. Reducing inequality is, in fact, one of the sustainable development goals at the heart of The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015.

This dynamic has prompted a renewed interest in understanding the socio-economic consequences of facing high (and even increasing) levels of inequality. Since the pioneering work of Kutznet (1955), a huge amount of works has been produced to investigate the relationship between inequality and the level of development or growth potential of countries; recent contributions include Brueckner and Lederman (2018), Litschig and Lombardi (2019), Panzera and Postiglione (2021). Another branch of the literature, flourished more recently, goes beyond the nexus between inequality and the "economic capital", to explore the link between inequality and "social capital", of which trust represents one of the most important components (see, among others, Birkelund and Cherry 2020, Roth and Wohlfart 2018, Sands and de Kadt 2020).

It is in this field of the literature that we intend to contribute. We aim at deepening our understanding of the relationship between inequality and institutional trust. In fact, while inequality has been on the rise, institutional trust has been slowly deteriorating over time (see OECD 2017) and this is an alarming event as it might weaken the social contract. Trust in institution is at the basis of the legitimacy and sustainability of political systems. Especially in periods of crisis - such as the economic crisis of 2007 whose effects have been propagating for more than one decade and the most recent crisis due to the COVID-19 pandemic - a reduced level of trust in institutions may represent a barrier to the implementation of recovery procedures. Institutional trust is also a pillar for social cohesion as it affects governments' ability to govern and act without having to resort to coercion, which impacts transaction costs and efficiency. Economic policies crucially depend on the compliance and cooperation of the population. Trust in institutions is essential for the working of the economy and economic growth. It is also key for investors and consumers' confidence. Last, there is a persistent need for policymakers to better understand the determinants of institutional trust against the background of increasing populist voting (Algan et al. 2017).

Thus, an increasing awareness about the role played by inequality as a determinant of trust in institutions is of primary importance. The existing literature on the relationship between these two phenomena is, in fact, scant (some exceptions are Gould and Hijzen, 2016 and Belabed and Hake, 2018; discussed in Section 2) and - as traditionally done in the interpersonal trust-inequality nexus (see Barone and Mocetti, 2015) - has entailed estimating a coefficient on a single inequality statistic in a regression, alongside other explanatory variables. However, there is a rooted consensus in the scientific community that it is not simply aggregate inequality that matters when evaluating its consequences on the society (see Voitchovsky, 2005). Shading light on its whole profile might disclose a more complex relationship as inequality experienced at different parts of the distribution can play a different role in the economy.

The current study suggests implementing a granular perspective of inequality as a determinant of institutional trust. We account for inequality in different parts of the distribution, namely at the top, middle, and bottom end, to shed light on the relationship between inequality and institutional trust. The empirical results support the main hypothesis that the profile of inequality matters for confidence in public institutions and suggest that inference based on a single summary statistic could be misleading, as it might reflect an average of offsetting effects. Merging individual data on institutional trust from the World Value Survey to country data on income inequality from the World Income Inequality Database on 82 countries around the world over the period 1981-2021, we show that the association between income inequality and trust in institutions is positive and statistically significant. When zooming in on the whole profile of inequality, we also show that this result is mainly driven by inequality within income groups, while inequality between income groups acts in the opposite direction, that is, it exerts a negative

impact on the degree of the confidence in institutions. Our results are robust to different measures of inequality and trust. We, instead, detect a dependence of our results on the countries' level of development. While the main findings are confirmed for the case of low and lower-middle income countries, they are reversed for the case of high-income countries, possibly witnessing the existence of different social norms and attitudes toward inequality in countries characterized by different level of economic development. Similarly, we detect some heterogeneities when replicating our analysis by distinguishing individuals according to their political views. Last, our analysis proves the different nature of institutional trust as compared with interpersonal trust, which may call for different policy recommendations.

Relative to the existing empirical literature on this topic, we offer three important contributions. The first is an instrumental one: the creation of a new database with estimates of inequality within and between different parts of the income distributions for 82 countries around the world between 1981 to 2021, which allow for a perfect decomposition of the aggregate inequality estimates measured through the Gini coefficient (GINI) and the mean log deviation (MLD). Our methodology can be extended to any inequality measure and help complementing the World Income Inequality Database that is the source of the income distribution data for our analysis. Through these new estimates, we can offer the first robust evidence on the association between the profile of inequality and institutional trust. Second, to the best of our knowledge, this is the first contribution that incorporates - in the analysis of the determinants of institutional trust - the whole profile of inequality and shows how this can help explain the association found between aggregate inequality and confidence in public institutions. Last, we show that inequality and its profile might affect institutional and interpersonal trust differently witnessing that the distinction between the different types of trust does matter.

The reminder of the paper is structured as follows. Section 2 discusses the theoretical background. Section 3 describes the data and the empirical strategy. Section 4 shows the main results. Section 5 provides robustness checks. Section 6 concludes.

2 Theoretical background

A propaedeutic step in the analysis of the nexus between inequality and trust is the definition of trust. The literature distinguishes between interpersonal trust (particularized or generalized trust) and institutional trust. The former is expressed with respect to other individuals in the society (friends, members of the family, other unknown individuals in the society). The latter is expressed with respect to different types of institutions (government, police, legal system, etc.). People can be very trustful with respect to other individuals, while at the same time showing high degree of distrust with respect to some or all institutions. Interest in interpersonal trust is motivated by the fact that this value reflects how much concern exits in the society about different people, in particular other people who can face socio-economic disadvantages (Delhey and Newton 2005).

To explain and study institutional trust, two main approaches can be followed. The institutional performance approach considers institutional trust as a consequence of institutional performance. Institutional trust is often explained as an evaluation of and response to the perception of design, performance, and outputs of institutions (Lühiste, 2006; Berg and Hjerm, 2010; Mishler and Rose, 2001; Suh et al., 2012; Godefroidt et al., 2017). Whereas, the social trust approach considers institutional trust as an extension of interpersonal trust, the idea is that institutional trust represents a positive externality generated by interpersonal trust (Suh et al., 2012; Mishler and Rose, 2001; 2005). Social relations and cooperation among citizens promote trust and a sense of civic engagement, which are important for institutional trust (Putnam et al., 1993; Guiso et al., 2004) and institutional compliance (Tabellini, 2008).

The empirical literature has unanimously agreed in favour of a negative, although sometimes weak, relationship between inequality and interpersonal trust (see Jordahl 2009). Indeed, inequality is seen as a measure of class cleavage, so that societies will be more trusting if people are less divided by this form of cleavage (Knack and Keefer 1997, Uslaner 2002, Zak and Knack 2001, Bjørnskov 2007, Rothstein and Uslaner 2005, Berggren and Jordahl 2006, Uslaner and Brown 2005, Fisher and Torgler 2013, Jordahl 2009, Gustavsson and Jordahl 2008, Alesina and La Ferrara 2000, 2002, Gustavsson and Jordahl 2008, Barone and Mocetti 2016).[1] Such empirical results are corroborated by robust experimental evidence proving the existence of a strong negative relationship between inequality and interpersonal trust (Gallego 2016, D'Amato et al. 2022).[2] This negative effect is thus a consolidated evidence and is justified on the base of different arguments. In presence of higher inequality individuals feel themselves increasingly distant from others in the same society. This economic distance is translated into a social and behavioural distance in such a way that every individual, in the same circumstance, will act differently or will make different choice (for instance on how to share and finance public goods). Moreover, individuals might perceive the process that generated current inequalities as unjust. Therefore, they might be induced to think that the others have unjustly access to higher resources than they have, and hence they will be less inclined to accept and trust others.

Unlike interpersonal trust, the focus on the determinants of institutional trust has only recently received attention (see Kaasa and Andriani 2021). Although interpersonal and institutional trust tend to be positively correlated, they refer to different phenomena under the sphere of individuals and societal attitudes. Furthermore, there may be situation in which people express low interpersonal trust and tend to compensate such social distrust by expecting that institutions will represent their interests (Aghion et al., 2010). Relevant contributions include Clausen et al. (2011) and Blanco and Ruiz (2013) who look at the impact of crime and corruption on institutional trust, Grimmelikhuijsen and Porumbescu (2013) and Porumbescu (2017) who examine the effect of transparency on trust in government, Roussey and Deffains (2012) who consider the impact of juridical resources on trust in juridical system.[3]

Looking at the determinants of institutional trust, and in particular at the impact of inequality, is relevant to understand the sustainability of the social contract. In fact, while interpersonal trust helps reducing transaction costs and, thus, is transformed into an engine for economic growth, institutional trust would make easier the efficient organization of the society itself. This is particularly true for modern democratic societies, whose political outcome strongly depend on the active participation of citizens, through voting for instance (Hudson 2006). The studies previously mentioned are prominent in the literature on trust but none of them investigates the specific impact of inequality and in particular its profile on institutional trust. In addition to be enlightening from a pure positive perspective, such analysis would represent a relevant information for the policymaker that can be used to better shape public policies or to change the approach through which public services are provided.

In a recent paper, Belabed and Hake (2018) use data from comparable household surveys across ten Central, Eastern and Southeastern Europe (CESEE) countries over the 2009-2015 to show that regional and country income inequality are negatively and significantly correlated with the probability to trust national governments. Gould and Hijzen (2016) focus on United States over the period 1980-2012 and Europe over the period 2002-2014. Their results provide robust evidence that overall inequality lowers an individual's sense of trust in institutions.

[1] See also Ananyev and Guriev (2019) where inequality is introduced as a control variable to test the effect of income change on trust.

[2] Other works go beyond inequality measured in a pure monetary context and study the effect of inequality in other non-monetary dimensions on trust (see, among others, Beugelsdijk and Klasing 2016, Hooge et al. 2009, Leigh 2006).

[3] See also Fungáčová et al. (2019) and Knell and Stix (2015) who look at the determinants of trust in banks.

Our contribution goes beyond the hypothesis investigated in these works. In addition to consider a longer time-horizon (from 1981 to 2021) and a worldwide perspective, we make light on the mechanism that could explain such nexus by exploring the impact of the whole profile of inequality along each country's income distribution on the main outcome variable. To this aim, we make use of the decomposability property of well-known inequality indexes to investigate the role played by inequality within and between different parts of the distribution, and how this might explain the impact of aggregate inequality on trust. Moreover, we show that distinguishing between institutional and interpersonal trust does matter when understanding the consequences of inequality.

From a technical perspective, we use the Gini index as inequality measure for the cases of both aggregate and granular inequality, rather than quantile ratios mostly used by the previous literature as a proxy of the latter. The Gini index - which is a function of the pairwise income differences across individuals – measures interpersonal differences more accurately than quantile ratios. Furthermore, the use of the same index to proxy total inequality and its profile allows to have a coherent comparison between the effect of each of these types of inequalities on institutional trust.

Hence, in this paper we argue that it is not only inequality in the whole distribution that matters when assessing its consequences on institutional trust. The profile of inequality is key, as inequality experienced at different parts of the distribution can play a different role in the economy.

Recent developments in the literature have shown that inequality within different parts of the income distribution have different implications when it comes to evaluate the effect of inequality on the growth's prospects of a society (see, among others, Vitchovsky 2005; Frank, 2009; Biswas et al. 2017). Bottom inequality is bad for growth because it implies higher levels of poverty, which, in the presence of credit constraints, make it difficult for the poor to acquire education. It might also lead to greater crime and social instability. In contrast, a positive impact of top inequality on growth is interpreted as supporting the classic theoretical argument that considers higher inequality as a determinant of higher savings and hence as an ingredient of growth-enhancing investments. Since people's satisfaction with public institutions also depends on the economic performances of a country, often used as a metric to evaluate government's actions, one may expect to observe similar patterns when focusing on institutional trust rather than growth. However, alternative interpretations of the inequality in different parts of the distribution are possible, thereby originating different impact on institutional trust. For instance, if an incentive effect prevails, higher inequality within each part of the distributions might push confidence in public institutions which are judged to reward adequately effort. By contrast, if an identification effect prevails, the higher the inequality within each income class, the lower will be the feeling of identification with the other members of the class. In such contexts, individuals will face alienation which will ultimately be reflected into lower confidence in public institutions.

At the same time, high fragmentation between income groups could bring about to the phenomenon of "social separatism" and antisocial behaviours might arise consequently, especially when income inequality is reflected by political polarization. This is a situation in which the rich get involved in lobbying activities to force the introduction of policies that benefit themselves, but that result into hampering the growth opportunities of the poor. For instance, they might prevent the implementation of pro-poor and other policies, like spending on human capital or infrastructure, appropriate the country's resources, and subvert the legal and political institutions by rent-seeking and corruption (see Easterly, 2001; Glaeser et al., 2003). This thesis is supported by the empirical evidence showing that it is mostly top inequality that is holding back growth at the bottom (Van der Weide and Milanovic, 2018). In the presence of social separatism, individuals belonging to the rich class do not have any interest in public services such as public health and education, the quality of these services deteriorates as a consequence and poor individuals may find it harder to escape poverty (Bénabou, 2000). In such a context, high inequality between income classes may result in low government spending and persistent high inequality, hence low trust in public institutions.

The profile of inequality is acquiring a central role in the political arena as well. Indeed, the increase in inequality in many countries around the world has been proved to be mostly due to the extraordinary increase in the income share held by the rich (see Atkinson & Piketty, 2007, 2010; Piketty, 2013, 2020). Thus, incorporating concerns for inequality at the top of the distribution is important in the design of public policy. Proposals for higher top income tax rates, for example, have been formulated following the increasing awareness of the rise of top income shares. Government's failure to comply with such proposals could be an additional source of people's dissatisfaction and distrust toward national institutions. Based on the performance approach, higher value of between groups inequality might negatively impact institutional trust, as a reflection of the fact that individuals perceive such high value as ineffectiveness of public policies to alleviate income disparities across social classes. A mirroring argument can be made: higher inequality between groups implies that rich will further enlarge their income share and hence their savings which will be translated into higher growth on the assumption that the higher the level of income the higher the marginal propensity to save. The increase will eventually benefit the poor since economic growth increases the probability of providing more public good, thus higher trust in government. A cooperation approach can also be used to conjecture the existence of a relationship between institutional trust and inequality between income groups. With high between groups inequality, the contribution of the rich class to the public good becomes crucial for its provision. Consequently, the poorer classes may tend to condition their contribution to the rich one's. At the same time, the dependence of the poor class on the cooperation with the rich one, might push the poor towards social engagement and prosociality, and using the social trust approach this might be reflected into higher institutional trust (see, among others, Markussen et al. 2021, Martinangeli and Martinsson, 2020). If the idea of free riding is more pervasive, the opposite argument can be made and thus inequality between rich and poor would impact negatively on trust.

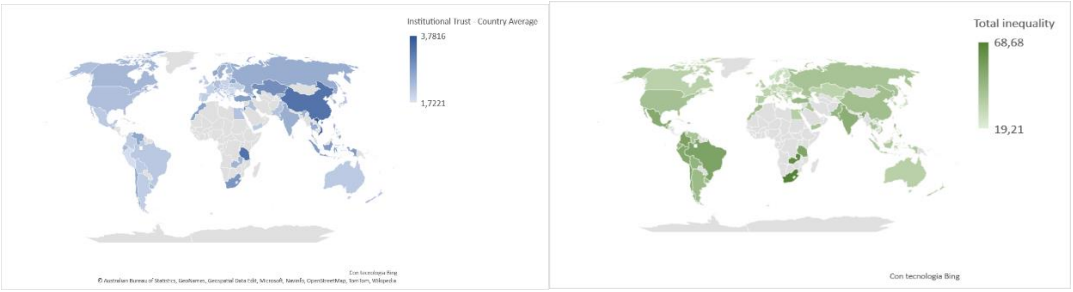
Last, the profile of inequality is also relevant when observed from the perspective of relative concerns theory, according to which people have social preferences, so that their utility also depends on the consumption or utility levels of others. Some theories of relative concerns predict negative welfare effects when friends and neighbours become better-off. Models of "envy" assume that any improvement benefited by richer individuals acts as a negative externality on own utility (Friedman & Ostrov, 2008), by contrast models of "compassion" assume that a welfare improvement experienced by poorer individuals has a positive effect on own utility (Bolton & Ockenfels, 2000). It is then possible to infer that while under models of envy individuals may be more sensitive to inequality in the top end of the distribution, in models of compassion it is inequality at the bottom that matters more. In more referenced models, envy and compassion coexist but they are combined in such a way that the negative effect of an income increase of a richer individual more than outweighs the positive effect of an income increase of a poor individual (Fehr & Schmidt, 1999). Thus, distinguishing between different types of inequality is fundamental to understand the actions that can be put into place in order to strengthen the level of confidence in public institutions, as individuals maybe more prone to accept one type of inequality while fighting to reduce the other.

This discussion brings us, from one side, to hypothesize that there exists a relationship between aggregate inequality and institutional trust, from the other side, to remain agnostic on its sign as it can be the results of compensating effects and thus might hide the counteracting effects of the association found between different types of inequality and trust in institutions.

3 Data and method

To explore the relationship between income inequality and institutional trust, we merge data extracted from two official surveys, namely the World Value Survey (WVS) - European Value Survey (EVS) integrated dataset, and the UNU-WIDER World Income Inequality Database (WIID).

Figure 1. Institutional trust in the World (1981-2021)



Source: Own elaborations based on WVS-EVS and WIID data.

Data on trust are collected by the WVS-EVS integrated dataset.[4] This consists of nationally representative surveys conducted in 115 countries which contain almost 90 percent of the world's population, using a common questionnaire, currently including interviews with almost 650,000 respondents. The reference universe of the WVS-EVS is represented by all persons aged 18 and older residing within private households in each country, regardless of their nationality, citizenship or language. The minimum sample size - i.e. the number of completed interviews which are included into the national data-set in most of countries is 1,200. We use seven waves of the WVS-EVS covering the period from 1981 to 2021. Trust in institutions is measured at the individual level with the answer that interviewers give to the following question: "Could you tell me how much confidence you have in the government: it is a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?". Thus, our outcome variable is an ordinal variable composed of four categories.

Data on inequality are collected by the WIID created by the UNU-WIDER, first launched in 2000, providing information on income inequality for 200 economies in an organized and accessible manner. We use the WIID standardised version (see UNU-WIDER 2021) which contains information about the average income of each percentile of the income distribution (based on GDP). Using this information, each country can be represented as a 100-dimensional vector of real numbers allowing us to estimate the whole profile of inequality. We focus on income inequality rather than on inequality in other economic relevant variables; this choice is motivated by the need to ensure the country and time coverage needed for our research's purposes. As inequality indicator, we use the Gini coefficient (the MLD will also be used for robustness purposes at the end of the empirical analysis).

The combination between the WVS-EVS integrated dataset and the WIID induces us to focus on a subsample of 82 developed, developing, and transition countries observed over the period 1981–2021.[5]

Figure 1 reports the country level average institutional trust – computed as the time average of the average scores at country level – and the time average inequality in all countries in our sample. The graph shows a high degree of heterogeneity across countries. Europe is the world region with lowest levels of confidence in government, but also the region with the lowest level of inequality. Whereas, Est-Asia shows highest institutional trust, while highest levels of inequality characterize part of Latin America and South Africa. Thus, it appears that there exists a positive, although weak, relationship between the two.

[4] The European Value Study (EVS) and the World Value Survey (WVS) are two large-scale, cross-national, and repeated cross-sectional longitudinal survey research programs. Since their emergence in the early 1980s, the EVS has conducted 5 survey waves (every 9 years) and the WVS has conducted 7 survey waves (every 5 years). Both research programs include a large number of questions, which have been replicated over time and across the EVS and the WVS surveys. Such repeated questions constitute the Integrated Values Surveys (IVS), the joint EVS-WVS time-series data which at the moment covers a 40-years period (1981-2021).

[5] Information about country and time coverage are available upon request to the authors.

However, as extensively explained above, this positive nexus may hide some other more complex relationship between the phenomena under investigation.

To shed light on this issue, we proceed by estimating the whole profile of inequality departing from the income percentile distribution provided by the WIID. In details, we estimate inequality in the lower (inequality in the bottom 40% of the distribution), middle (inequality within the 41st and 80th percentile), and upper (inequality in the top 20% of the distribution) part of the distribution. These three Gini indexes are a measure of within group inequality that are complemented with an estimate of inequality between these three income classes. Hence, our whole profile of inequality will be composed by four indicators of inequality: three indicators of within income group inequality (Gini index computed in the three different parts of the distribution) and one indicator of between group inequality. Notice that given that we work on income percentile distribution, the estimation of the above listed indexes represents a perfect decomposition of total income inequality, thus allowing to account for the many facets of inequality in the same distribution of income. To the best of our knowledge, this is the first paper to consider the whole profile of inequality as a determinant of a socio-economic relevant variable. Previous research focused on inequality profiles only accounts for some of the inequality components and measures these sub components of inequality though indices whose functional form is mathematically different from the that used to measure aggregate inequality. Thus, failing to account for a whole and coherent profile of inequality.

Hence, we estimate the following linear probability model.[6]

$$ITrust_{i,c,t} = \alpha + \beta \boldsymbol{Ineq}_{c,t} + \gamma \boldsymbol{X_{i,t}} + \rho \boldsymbol{Y_{c,t}} + \mu_c + \tau_t + \varepsilon_{i,t} \quad (1)$$

where *i* denotes the individual, *c* refers to the country and *t* indicates the year, with some gaps leading to an unbalanced panel. $\boldsymbol{ITrust}_{i,c,t}$ is the dependent variable measuring individual trust in the national parliament; $\boldsymbol{Ineq}_{c,t}$ is (the list of) our main independent variable(s), namely income inequality for the whole distribution or subgroups. In our main specifications we look at inequality within percentiles 1 to 40, 41 to 80, and 81 to 100, and inequality between these three income groups, using Gini indices. $\boldsymbol{X_{i,t}}$ is a set of individual control variables and $\boldsymbol{Y_{c,t}}$ the set of country controls described below. Finally, we include country (μ_c) and time fixed-effects (τ_t) to control for country-specific unobserved factors (e.g., constitutional features) and common shocks (e.g., global crisis); $\varepsilon_{i,t}$ is the error term.

$\boldsymbol{X_{i,t}}$ represents the vector of socio-demographic covariates. It includes age (*Age*) and age squared (*Age*^{2}) a dummy variable indicating the gender of the interviewed (*Gender*), a factor variable indicating her education attainment (*Education*). This are standard demographic variables to control for. We also include a factor variable indicating the employment status of the interviewed (*Empl*).

The vector of control variables $\boldsymbol{Y_{c,t}}$ has been defined by following the recent empirical literature on the determinants of trust in public institutions as well as of generalized trust (e.g., Gustavsson and Jordahl 2008; Stevenson and Wolfers 2011; Olivera 2015; Barone and Mocetti 2016; Wroe 2016; Alcaide 2017; Ananyev and Guriev 2019) and balancing the need to keep wide the sample of countries included in our analysis. We include: a variable capturing a country's economic development measured by the GDP per capita (*GDP*); a variables containing demographic characteristics, such as, the share of population living in urban areas (*Urban*); a variable that allows to account for labor market status, measured by the unemployment rate (*Unempl*). Descriptive statistics and detailed definition and sources of all variables are

[6] We use a linear probability model even if our dependent variables are categorical both to easy the interpretation of the results and because we include several fixed effects that might bias the estimates in nonlinear models (Greene, 2002). However, our results do not change significantly when using an ordered probit model. Estimation results using ordered probit are available upon request to the authors.

reported in Table A1 in the Appendix.

4 Results

Table 1 reports the main results of our analysis. The first three columns refer to the result of three different specifications of model (1) when $\boldsymbol{Ineq}_{i,t}$ contains only the Gini index for the whole distribution. In details, we start with a parsimonious model with the variable *Ineq* only (together with country and time fixed-effects) in column (1). In the second column we add the individual level controls and in the third column the country level controls. It clearly comes out that there exists a positive association between inequality and the level of trust toward public institutions. This effect is statistically significant across all specifications. For increasing values of income inequality, the level of trust increases, suggesting that in general inequality might not be detrimental for institutional trust in our sample of countries. This striking result greatly differs from previous studies on institutional or generalized trust, in specific regions of the world, all establishing a negative relationship. Our analysis, instead, confute these findings by showing that when a worldwide perspective is adopted, inequality may appear to boost institutional trust. At a first glance, this remains a counterintuitive result which call for further investigation. In this paper we argue that the positive correlation between institutional trust and total inequality is the result of countervailing effects stemming from the profile of inequality.

Table 1. Institutional trust, inequality and its profile

	Dependent Variable: institutional trust					
	(1)	(2)	(3)	(4)	(5)	(6)
Aggregate inequality	0.0202***	0.0162***	0.0150***			
	(0.00112)	(0.00118)	(0.00130)			
Inequality Between				-0.0254***	-0.0182**	-0.0275***
				(0.00689)	(0.00710)	(0.00736)
Inequality (1-40)				0.00178	-1.97e-05	0.00437*
				(0.00224)	(0.00226)	(0.00234)
Inequality (41-80)				0.0867***	0.0729***	0.0760***
				(0.00892)	(0.00936)	(0.0100)
Inequality (81-100)				0.0191***	0.0125***	0.0151***
				(0.00323)	(0.00334)	(0.00336)
Individual level controls						
Female		-0.00216	-0.000961		-0.00263	-0.00125
		(0.00368)	(0.00386)		(0.00368)	(0.00386)
Age		-0.00373***	-0.00345***		-0.00368***	-0.00348***
		(0.000642)	(0.000674)		(0.000642)	(0.000674)
Age squared		6.35e-05***	6.09e-05***		6.30e-05***	6.14e-05***
		(6.90e-06)	(7.23e-06)		(6.90e-06)	(7.23e-06)
Employment status:						
-Part time		-0.000739	0.000414		0.000236	0.00117
		(0.00690)	(0.00714)		(0.00690)	(0.00714)
- Self employed		-0.00796	-0.0113		-0.00829	-0.0117*
		(0.00673)	(0.00710)		(0.00672)	(0.00710)
-Retired		0.00134	0.000666		0.00169	0.000125
		(0.00717)	(0.00753)		(0.00717)	(0.00753)
-Housewife		0.0248***	0.00848		0.0253***	0.00870
		(0.00673)	(0.00718)		(0.00673)	(0.00718)
-Students		0.0230***	0.0399***		0.0234***	0.0397***
		(0.00852)	(0.00900)		(0.00852)	(0.00900)
-Unemployed		-0.0443***	-0.0412***		-0.0427***	-0.0409***
		(0.00704)	(0.00740)		(0.00704)	(0.00740)
-Other		-0.0526***	-0.0580***		-0.0513***	-0.0571***
		(0.0126)	(0.0132)		(0.0126)	(0.0132)
Education level:						
-Middle		-0.0691***	-0.0603***		-0.0680***	-0.0593***
		(0.00481)	(0.00504)		(0.00481)	(0.00504)
-Upper		-0.0573***	-0.0410***		-0.0565***	-0.0402***
		(0.00531)	(0.00556)		(0.00531)	(0.00556)
Country level controls						
GDP per capita			8.29e-06***			9.94e-06***
			(1.86e-06)			(1.87e-06)

Unemployment			-0.0105***			-0.00523***
			(0.00141)			(0.00154)
Urban population			0.0310***			0.0325***
			(0.00182)			(0.00181)
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
N Observations	250,439	241,346	213,435	250,439	241,346	213,435
R-squared	0.161	0.161	0.172	0.161	0.161	0.172
p>F	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' elaborations based on WVS-EVS and WIID.
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The constant, country and year fixed effects are included but their coefficients are not reported in the table.

In the attempt to find a reasonable explanation to these findings, we estimate model (1) substituting to aggregate inequality its profile, that is, considering inequality in the bottom 40 per cent of the distribution, inequality between 40 and 80 per cent of the distribution, inequality in top 20 per cent of the distribution, and inequality between these income classes. Results are gathered in columns (4) to (6). Again, we start with a parsimonious model with only the inequality measures (together with country and time fixed-effects) in column (4) and progressively add individual level controls (5) and country level controls (6).

The sign and the significance of these estimates reveal that it is not only aggregate inequality that matters. Indeed, we inspect the existence of significant countervailing association between inequality and trust in government. The positive association proven in Table 1, column (1)-(3), is confirmed by all the within inequality indexes, with the exception of inequality within the bottom 40 percent of the distribution whose sign of the association appears to be negative in one out of the three specifications, although it remains statistically non-significant. Inequality within the middle-income groups and within the richest 20 percent of the distribution, instead, are positively and significantly associated to trust. By contrast, inequality between these income groups arises to be negatively and significantly associated with trust. Thus, the results in Table 1 corroborate our main hypothesis.

In order to interpret the meaning of these results, notice that the three income groups considered can be associated with the classic distinction between lower, middle and upper class, that characterizes public and political debates. We must acknowledge the existence of theories of social justice that go beyond this simple tripartition of the population, to look at more articulated ways of identifying groups of similar individuals (see, among others, Peragine et al. 2014). These approaches are based on normative stands toward the definition of fair and unfair inequality. It is however hard to dispute the fact that the income based tripartition is the most natural and intuitive way, for the average citizen, to identify groups of similar individuals. Therefore, form a positive perspective, if such a difference between fair and unfair inequality were to exist, we should expect it to appear in the different effect that between and within group inequality exert on institutional trust. For this reason, inequality between groups can be interpreted as a measure of the "unfair" inequality, that is the inequality between social classes, and inequality within a given income group as "fair" or more tolerable inequality which stands from the remuneration of effort. An exception to the latter interpretation might concern inequality within the 1st and 40th percentile of the income distribution, as this is positively correlated with poverty, which is a far more important source of injustice.

The negative correlation between trust and Inequality Between is then rationalizable under the performance approach. Individuals may perceive high between class inequality as clear proof of the institutions' inability of effectively fighting inequality. Moreover, even with functioning democracies, high Inequality Between makes it harder for many citizens to access political power. It is then natural to experiment a sentiment of distance from the public institutions. While this dynamic may be beneficial for the richer class, the social unrest and higher criminality induced by high inequality may severely counterbalance the potential benefits.

Inequality within income groups – that can be interpretable as inequality among similar individuals – acts as an incentive effect. Individuals tend to evaluate positively the operations of public institutions that make it possible to realize an environment where individual effort is compensated. Thus, they tend to trust more the social planner and consequently the activities executed by the public institutions. This effect seems to vanish out for the case of the poorest individuals as higher inequality among poor could also imply higher probability of poverty which outweigh the incentive effect. Following similar arguments, between-groups inequality being interpretable as inequality among dissimilar individuals is less tolerated. It is considered more unfair because often due to factors out of individual control and the government's inability of effectively redistribute, which is reflected into lower confidence toward public institutions. In fact, as it has been documented by the literature, trust in public institutions is the results of the judgement that they give to the government actions after they compare what has been done and what the individuals thinks the government should ideally do (Bouckaert and van de Walle, 2003). Higher inequality between groups increases individual's feeling of distance. Moreover, high levels of between income groups inequality raise concerns about the ability of those at the bottom of the distribution to support themselves and about the opportunity for all members of society to share in national prosperity. High inequality at the top of the income distribution is positively associated with economic performance and the potential for investment and future development. While the positive sign of Gini (41-80) is partially justified by this dynamic, we may also observe that a mean-preserving higher dispersion in the middle class may reduce the perceived between class inequality.

Individual characteristics as well remain important for institutional trust. Women seem to be less confident in institutions although this gender difference is not statistically significant. Age is negatively related with institutional trust, but this relationship is highly non-linear, as suggested by the coefficient for age squared. On average, younger people have had less occasions of interaction with public institutions than older individuals; therefore, they are less prone to express low level of trust in institutions. This sign is confirmed when individual's employment status is considered as students appear to be trusting institutions more than similar employed individuals. Not surprisingly, being unemployed increases institutional distrust. Employment status seems to matter for institutional trust, only for the case of student and unemployed (the coefficient on being housewife is significant only in two out of the four specifications, while the coefficients of all other employment status is never significant). Last, the link between trust and education is also clear-cut: higher educational attainments erode citizens' trust toward institutions.

As for the country level controls, we observe some regularities across specifications in Table 1. The level of economic development of a country, measured though per-capita GDP contributes to increase the extent of institutional trust, possibly also because higher economic development would imply that governments have higher resources to finance public good and services. The amount of population living in urban areas is positively associated with trust, possibly because they have a closer contact with public institutions and can more easily benefit from the provision of public goods. Last, as expected, the level of unemployment has a strong negative correlation with institutional trust highlighting that individuals living in countries characterized by a malfunctioning labour market tend to be much less confident on institutions and their policies.

We then ask whether the analysis of the role played by inequality and its profile brings to different conclusions when focusing on interpersonal trust rather than institutional trust. To answer this question, we replicate the above analysis by using two measures of interpersonal trust as the main outcome variable. As shown in Table 2, the signs of the coefficients on almost all the inequality measures considered are reversed. This supports our argument that different information can be produced when shifting the focus from institutional to generalized trust. In detail, aggregate income inequality is negatively associated with generalized trust, corroborating results from existing empirical literature. Although generalized and institutional trust may be strongly correlated, they still refer to different aspects of social capital and their formation can be different. This justifies the focus on institutional trust to complement the existing

analysis on inequality and trust. The estimates reported in column (2) and (4) reveal that also within and between group inequality affects interpersonal trust differently from institutional trust. In fact, it is within income group inequality that harms trust, whereas between group inequality appears to boost it. The only similarity between the two types of trust is that the result of the impact of aggregate inequality on trust is mostly driven by within group inequality.

The results in Table 2 clearly show that institutional and interpersonal trust are different concepts. High inequality reduces interpersonal trust, as it increases the feeling of dissimilarity between people. Observe that this effect is particularly strong within the middle class, in line with polarization that many countries are experimenting and the generalized feeling that the middle class is disappearing. The positive sign observed for Inequality Between can be associated to a countervailing effect which reduces the feeling of dissimilarity. Indeed, for fixed within classes inequality, higher inequality between implies higher distance between the average income in each class. As a consequence, for example, an individual in the low-income class will under-evaluate the income distance form another low-income individual, when a middle-income individual is taken as reference. In a more formal way, we can say that the dissimilarity between two individuals in the same income class is a decreasing function of the average income in the other classes.

Table 2. Inequality and trust: interpersonal trust

	Dependent variable: Trust in people you know		Dependent variable: Trust in people met for the first time	
	(1)	(2)	(3)	(4)
Aggregate Inequality	-0.0123***		-0.0200***	
	(0.00214)		(0.00236)	
Inequality Between		0.114***		0.00667
		(0.0157)		(0.0180)
Inequality (1-40)		-0.0566***		-0.0285***
		(0.00566)		(0.00668)
Inequality (41-80)		-0.218***		-0.105***
		(0.0243)		(0.0275)
Inequality (81-100)		-0.0326***		0.0123*
		(0.00628)		(0.00723)
Individual level controls	YES	YES	YES	YES
Country level controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Observations	129,374	129,374	127,010	127,010
R-squared	0.197	0.197	0.191	0.192
p>F	0.000	0.000	0.000	0.000

Source: Authors' elaborations based on WVS-EVS and WIID.

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The constant, country and year fixed effects as well as individual and country level controls are included but their coefficients are not reported in the table.

We deepen our understanding of the nexus between institutional trust and inequality by investigating the existence of potential heterogeneities.

First, we split our sample of countries in three subsamples, according to the income group classification of each county. In particular, we consider low and lower middle-income countries, upper middle-income countries and high-income countries, following the standard partition proposed by the World Bank. The results are collected in Table 3 and reveal that the nature of the relationship between inequality and confidence in institutions depends on the level of economic development of a given country. In fact, the main results reported in Table 1 remain valid only for the group of low and lower middle-income countries. They are completely reverted for the case of high-income countries and are instead more ambiguous for the case of upper middle-income countries. This might reveal the existence of different social norms and different attitude toward inequality.

Different from poorer countries, a negative association between aggregate inequality and institutional trust arises in developed countries. The sign of this association is determined by the within income component but, as a second difference between the two groups of countries, this component seems to have a negative impact on trust in high income countries as opposed to the positive sign that arises in less developed countries. Thus, it appears that in high income countries the loss of identification that is generated when inequality among members of the same income groups increases (e.g., Bardhan et al., 2007; Dayton-Johnson and Bardhan, 2002) outweighs the incentive effect, undermining the institutional framework underpinning cooperation, being reflected in lower levels of institutional trust. Individuals tend to arguably have reciprocity preferences, so they are more prone to contribute to the public good as long as others reciprocate fairly (Fischbacher et al., 2001). From this perspective, inequality makes cooperation harder as it is more difficult to determine what constitutes a 'fair' contribution in an unequal group. This might be reflected into lower quality of public services, that people may consider as failure of the public sector. Last, also the signs defining the possible impact of between income groups inequality on trust diverges among countries. It is negative for the case of low- and middle-income countries, but positive for the high-income ones. These results tell us that while inequality between income classes is in fact perceived as a form of class cleavage in less developed countries, this is not the case for developed countries. The results are also consistent with the view that rising inequality harms collective action in developing countries, and that this relationship is intensified by pessimistic expectations about cooperation, which may in turn be generated by high levels of corruption and low level of institutional trust.

Table 3. Inequality and trust by countries' level of development

	Dependent variable: institutional trust					
	High income		Upper-middle icome		Lower-middle and low income	
	(1)	(2)	(3)	(4)	(5)	(6)
Gini	-0.0163***		-0.00307		0.630***	
	(0.00300)		(0.00218)		(0.0251)	
Gini Between		0.126***		-0.0563*		-4.105***
		(0.0154)		(0.0311)		(0.172)
Gini (1-40)		-0.0650***		-0.00859*		1.304***
		(0.00609)		(0.00441)		(0.0637)
Gini (41-80)		-0.296***		0.209***		6.225***
		(0.0240)		(0.0328)		(0.256)
Gini (81-100)		-0.00392		-0.0105		0.121***
		(0.00530)		(0.0196)		(0.0108)
Individual level controls	YES	YES	YES	YES	YES	YES
Country level controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Observations	108,991	108,991	79,209	79,209	25,235	25,235
R-squared	0.117	0.120	0.220	0.221	0.219	0.219
p>F	0.000	0.000	0.000	0.000	0.000	0.000

Source: Authors' elaborations based on WVS-EVS and WIID.

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The constant, country and year fixed effects as well as individual and country level controls are included but their coefficients are not reported in the table.

We now explore heterogeneities in individual characteristics. We distinguish individuals according to their view on the redistributive role of the government. We consider individuals agreeing with the view that the government should tax the rich and subsidize the poor and individuals that disagree with it. The results are collected in Table 4 and reveal that, while aggregate inequality is always positive and significant, the profile of inequality only matters for individuals that support the redistributive role of the State. These findings might help revealing the transmission channel that is in act. Among the possible justifications to the association between inequality and institutional trust, these results seem to corroborate the performance approach concerning inequality between groups and the incentive approach concerning inequality within groups. These individuals strongly believe that public institutions should operate in

fulfilling equity in the society by implementing redistributive policies. Previous literature has argued that government intervention to solve collective action problems is not always desirable, and that cooperation among individuals would instead outperform it (Ostrom, 1990). However, recent analyses also prove that poor individuals contribute a larger share of their endowment to public goods production than rich individuals (Martinangeli and Martinsson, 2020). This has important implications when coupled with our analysis on institutional trust. They allow to infer that tax-based systems may be more egalitarian than systems based on voluntary commitment and they may be beneficial for institutional trust, so that government intervention may be superior to community-based solutions. Indeed, individuals that do not believe the government should redistribute are likely to be either insensitive to inequality (maybe because they deem it fair) or believe that the most efficient redistribution can be operated by market forces. Consequently, they do not blame institutions for the observed inequality. At the same time, those who believe that the government should intervene to redistribute, blame the institutions for the observed inequality so that more egalitarian policies would, not only improve social welfare, but also positively impact institutional trust.

Table 4. Inequality and trust by support for redistribution

	Dependent variable: institutional trust			
	Governments tax the rich and subsidize the poor			
	Against		In favor	
	(1)	(2)	(3)	(4)
Aggregate Inequality	0.00995**		0.0143***	
	(0.00440)		(0.00146)	
Inequality Between		-0.0113		-0.0194**
		(0.0338)		(0.00823)
Inequality (1-40)		0.0158		0.00298
		(0.0128)		(0.00267)
Inequality (41-80)		0.0770		0.0579***
		(0.0523)		(0.0113)
Inequality (81-100)		-0.00454		0.0143***
		(0.0134)		(0.00384)
Individual level controls	YES	YES	YES	YES
Country level controls	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Observations	45,106	45,106	168,329	168,329
R-squared	0.213	0.213	0.165	0.165
p>F	0.000	0.000	0.000	0.000

Source: Authors' elaborations based on WVS-EVS and WIID.

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The constant, country and year fixed effects as well as individual and country level controls are included but their coefficients are not reported in the table.

5 Robustness

To conclude our analysis, we perform a set of robustness checks. First, we add as explanatory variable the variations in the macro indicators to account for time trend (table A2 in the appendix column (1) and (2)). Second, we consider an alternative indicator of inequality. Thus, we compute bottom, middle, and top inequality using the mean log deviation and we run equation (1) using these alternative estimates of inequality (Table A2 in the appendix column (3) and (4)). Last, we estimate again model (1) by focus on trust in parliament as an alternative to trust in government (Table A2 in the appendix column (5) and (6)). The results of these additional analyses show that our main conclusions hold.

Last, the small number of countries can in principle represent a source of bias of our estimates, given that the main explanatory variables are measured at country level. To account for this issue, we provide

another robustness check by performing jackknife tests, where the sample of each specific country is repeatedly dropped from the estimations. As reported in Figure A.1 in the Appendix, our main results remain. Apart from few exceptions, the coefficients on inequality are stable and statistically significant across different samples obtained when dropping one country at a time.

The preceding analysis has shown significant relationships between trust and aggregate inequality, which can be decomposed in countervailing effects stemming from the profile of inequality. Nevertheless, there can be a problem of reciprocal causality between profile of inequality and institutional trust. Inequality in and between different parts of the distribution can effectively lead to a heterogeneous impact on trust, as discussed so far. However, at the same there can be both a virtuous and a vicious cycle with trust being reflected in different profiles of inequality in different countries. This potential for bi-directional causation complicates the interpretation of the partial correlation between profile of inequality and confidence in institutions generating a classic identification problem. However, we also note that the problem of reverse causality may not be so severe in this context given that the independent variables, the inequality indexes, are measured at aggregate national level, while the outcome variable refers to an individual behaviour. It would take some time to activate the virtuous/vicious effects of the erosion of trust and hence social capital to be reflected in inequality also considering that this variable is not changing fast across years. But even if we were willing to address reverse causality and endogeneity using instrumental variables techniques, finding valid instruments in this context is very difficult and the exclusion restrictions that scholars impose to them are often theoretically difficult to justify (see Sovey and Green 2011), especially in our context in which is not simply aggregate inequality that would need to be instrumented but its whole profiles.

6 Conclusions

The central hypothesis of this paper has been that the sign of the relationship found between inequality and institutional trust may hide opposite evidence regarding the association of inequality in different parts of the income distribution with institutional trust. The empirical analysis undertaken in section 4 supports this hypothesis. We show that the aggregate positive effect is mostly explained by the impact of inequality within income groups on institutional trust. Inequality between income groups acts in the opposite direction by hampering the consolidation of confidence that individuals have in their institutions. An important contribution of this study is to highlight the potential limitation of investigating the effect of income distribution on trust - and more generally on social capital - using a single inequality index.

From a policy perspective, our empirical findings contribute to widen knowledge about the determinants of trust in institutions and the factors that might alleviate the adverse effects of income inequality on trust. Redistributive policies financed via proportional taxation of top incomes are likely to promote institutional trust via reducing between groups inequality and inequality in the bottom part of the distribution, while preserving relative inequality at the top.

Differently from previous studies, we use more consistent estimates of the profile of inequality and more robust methodologies. The combination of these ingredients produces additional innovative evidence which refer to the distinction between institutional and interpersonal trust in the assessment of the impact of inequality on social capital. Although the two tend to be positively correlated, their origins (and their consequences) may be different. It might be inferred that an analysis on the determinants and effects of social capital that only uses a measure of generalized trust as a proxy might produce misleading or incomplete information.

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Appendix

Table A1. Variables' definition and descriptive statistics

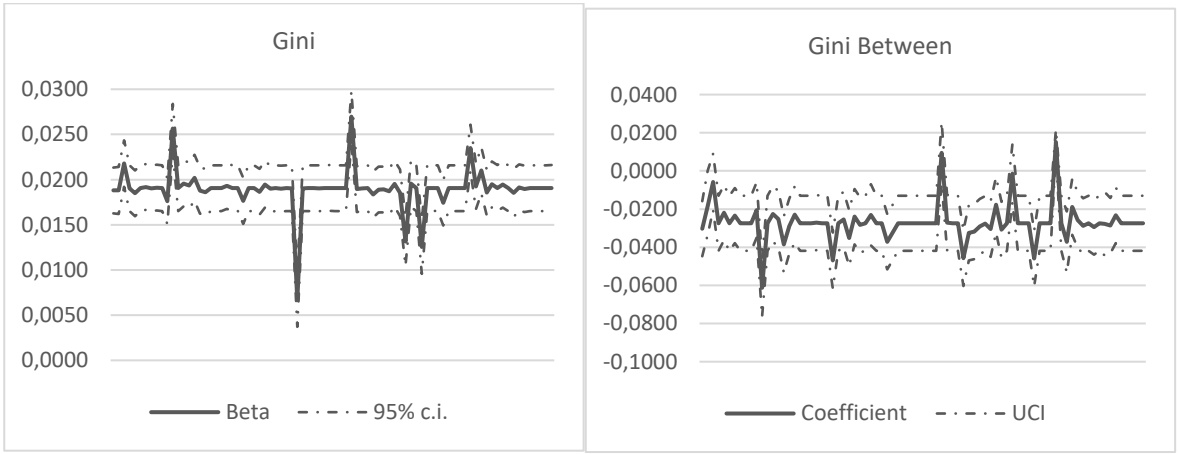
Variables	Definition	Sources	Mean	Std. Dev.	Min	Max	Obs
Itrust	Could you tell me how much confidence you have in the government: [1] it is a great deal of confidence, [2] quite a lot of confidence, [3] not very much confidence or [4] none at all?	WVS-EVS	2.33	0.93	1	4	219,926
Aggregate Inequality	Gini coefficient of household equivalent disposable income, whole distribution.	WIID	37.51	9.21	17.71	70.13	219,926
Inequality Between	Gini coefficient of household equivalent disposable income, between bottom 40%, 41-80%, top 20% od the distribution.	Own elaborations based on WIID	32.41	8.02	15.25	60.58	219,926
Inequality (1-40)	Gini coefficient of household equivalent disposable income, within bottom 40% of the distribution.	Own elaborations based on WIID	20.04	5.13	8.18	41.88	219,926
Inequality (41-80)	Gini coefficient of household equivalent disposable income, within 41 to 80% of the distribution.	Own elaborations based on WIID	11.41	3.18	5.45	25.26	219,926
Inequality (81-100)	Gini coefficient of household equivalent disposable income, with top 20% of the distribution.	Own elaborations based on WIID	21.93	6.90	7.66	47.01	219,926
Age	Age in years of the interviewed	WVS-EVS	44.35	17.20	15	103	219,926
Age squared	Age in years, squared, of the interviewed	WVS-EVS	2,261	1,655	225	1,069	219,926
Gender	Gender of the interviewed: 0 Male, 1 Female	WVS-EVS	1.53	0.50	0	1	219,926
Educational level	Educational level of the interviewed: [1] lower; [2] middle; [3] upper	WVS-EVS	2.00	0.75	1	3	219,926
Employment status	Employment status of the interviewed: [1] full time employed; [2] part time employed; [3] self-employed; [4] retired; [5] housewife; [6] student; [7] unemployed; [8] other	WVS-EVS	3.19	3.13	1	8	219,926
GDP	Per capita GDP in PPP, 2020 constant prices	World Bank (WDI)	26,849	19,641	1423	118,154	219,926
Urban	Urban population share: people living in urban areas as defined by national statistical offices as a percentage of the total population	World Bank (WDI)	67.93	15.86	22.67	100	219,926
Unemployment	Unemployment rate	World Bank (WDI)	8.43	6.20	0.25	34.50	219,926

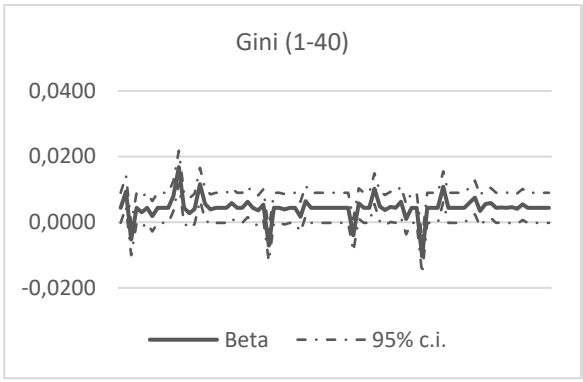
Table A.2 Inequality and trust: robustness

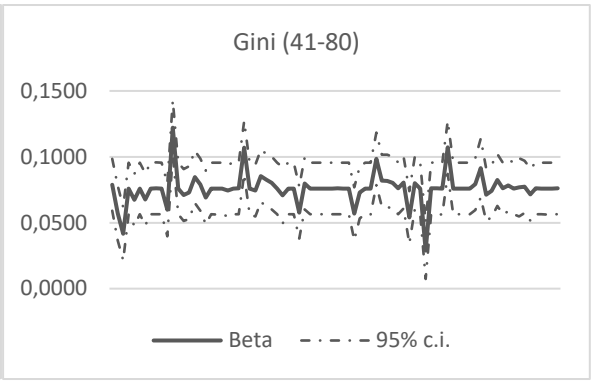
	Dependent variable: institutional trust					
	Robustness to time trend		Robustness to inequality index		Robustness to trust measure	
	(1)	(2)	(3)	(4)	(5)	(6)
Inequality	0.0131***				0.00760***	
	(0.00251)				(0.00114)	
Inequality Between		-0.133***				-0.0131**
		(0.0129)				(0.00657)
Inequality (1-40)		0.0358***				0.00331
		(0.00487)				(0.00215)
Inequality (41-80)		0.246***				0.0154*
		(0.0181)				(0.00876)
Inequality (81-100)		0.0488***				0.0163***
		(0.00551)				(0.00307)
MLD			0.00960***			
			(0.00156)			
MLD Between				-0.0530***		
				(0.00731)		
MLD (1-40)				0.00305*		
				(0.00165)		
MLD (41-80)				0.501***		
				(0.0394)		
MLD (81-100)				0.0438***		
				(0.00690)		
Individual level controls	YES	YES	YES	YES	YES	YES
Country level controls	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Observations	130,076	130,076	130,076	130,076	220,134	220,134
R-squared	0.185	0.187	0.185	0.187	0.177	0.177
p>F						

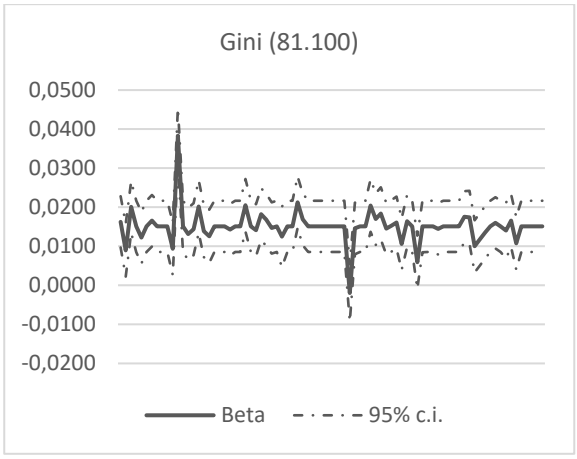
Source: Authors' elaborations based on WVS-EVS and WIID.
Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure A.1 Inequality and trust: jackknife









Source: Authors' elaborations based on WVS-EVS and WIID.