Inequality and trust: new evidence from panel data

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Abstract. The relationship between inequality and trust has attracted the interest of many scholars who have found a negative relationship between the two variables. However, the causal link from inequality to trust is far from being identified: the existing empirical evidence admittedly remains weak, as the omitted variable bias, reverse causation and/or measurement error might be at work. In this paper, we reconsider the country-level evidence to address this issue. First, we exploit the panel dimension of the data, thus controlling for any country unobservable time-invariant variables. Second, we provide instrumental variable estimates using the predicted exposure to technological change as an exogenous driver of inequality. According to our findings, income inequality significantly and negatively affects generalised trust. However, this result only holds for developed countries. We also provide new insights on the effects of different dimensions of inequality, exploiting measures of both *static* inequality – such as the Gini index and top income shares – and *dynamic* inequality – proxied by intergenerational income mobility.

Keywords: trust, inequality, top incomes, intergenerational mobility

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1. Introduction

There is a general consensus that trust is important for economic efficiency and growth. In the presence of imperfect information, costly enforcement or coordination failures, trust may overcome market failure and lead to achievements that would not be possible otherwise. Indeed, on the empirical side, trust has been found to be associated with less corruption and more effective bureaucracies (La Porta et al., 1997), financial development (Guiso et al., 2004) and, in a broader perspective, higher economic development (Knack and Keefer, 1997; Zak and Knack, 2001; Dearmon and Grier, 2011).

Unsurprisingly, many social scientists have thus attempted to understand the determinants of trust and why it varies widely across countries (Knack and Keefer, 1997; Zak and Knack, 2001; Bjørnskov, 2006; Leigh, 2006a).[1] Most of these studies have focussed on the relationship between trust and income inequality (and/or other measures of heterogeneity such as ethnic or religious fractionalisation), reaching the general conclusion that there is a robust negative correlation between inequality and generalised trust. According to the literature, this correlation is driven by three main factors.[2] The first has its theoretical roots in the homophily principle (McPherson et al. 2001) and aversion to heterogeneity (Alesina and La Ferrara 2002).[3] From this perspective, economic inequality is a source of diversity and socio-economic distance: the higher the level of economic inequality, the higher the "social barriers" between different groups and the less that individuals will feel familiar with and connect to other people. This, in turn, hampers the formation of trust. The second factor is related to the concept of fairness: inequality may generate a perception of injustice and the belief that others have unfair advantages, thus hindering the development of trust towards others.[4] The third factor refers to the hypotheses of resource conflict. Namely, unequal communities may disagree over how to share (and finance) public goods. These conflicts, in turn, break social ties and lessen the formation of trust and social cohesion (Delhey and Newton, 2005).[5] The recent global economic crisis has generated renewed interest in this topic. The political slogan "we are the 99 percent" betrays an intolerance of the concentration of income and wealth in the top 1 percent and the belief that the crisis is attributable to the mistakes of a tiny minority. The legitimacy of inequality itself has thus been questioned, with potential negative consequences in terms of social cohesion and trust towards others.

Despite the relevance of the issue, the existing empirical evidence on the inequality-

[1] Other studies have exploited within country variation in the level of trust (Alesina and La Ferrara, 2002; Leigh, 2006b; Gustavvson and Jordahl, 2008; Blanco, 2013).
[2] See Jordahl (2007) for a review.
[3] The propensity to place greater trust in someone who is closer socially has been suggested also by Coleman (1990) and Fukuyama (1995).
[4] It is worth noting that a perfectly equal distribution is not necessarily fair and inequality is not necessarily unfair. See Roemer (1998 and 2002) and Alesina and Angeletos (2005) for a discussion on the determinants of inequality and related perceptions of fairness.
[5] Regarding more micro-determinants, some studies have highlighted the role of religion and education (Bjørnskov, 2006; Leigh, 2006b). Other studies have found evidence in support of the relative income hypothesis, that is, frustration with not being able to "keep up with the Joneses" decreases generalised trust (Fischer and Torgler, 2006).

trust nexus admittedly remains weak. First, the relationship between the two variables has typically been observed at a single point in time: the cross-sectional relationship might be severely biased because inequality and trust might likely have common correlates that cannot all be credibly controlled for, in spite of a large number of covariates one can include in the specification.[6] Second, reverse causality from trust to inequality might create an upward bias. Bergh and Bjørnskov (2011) show that countries with higher trust levels are more prone to have larger welfare states so reducing inequality; alternatively one may argue that higher trust might lead to better institutions and better-performing markets and these, in turn, might favour a more equitable income generation process. Third, measurement error in inequality measures, which is not unlikely in a cross-country setting, might result in a downward bias. All in all, the causal link from inequality to trust is far from being identified.

In this paper, we provide a reappraisal of country-level evidence and, in particular, attempt to address the drawbacks of previous studies by exploiting the panel dimension of the data and by using an instrumental variable (IV) approach. Indeed, several waves of the World Value Survey (WVS) are now available, covering the period from the beginning of the 1980s to the mid-2000s, a sufficiently long period to make the within variability of trust not negligible. Moreover, several measures of income inequality have also recently been made available for many countries and longer time periods. Therefore, we have a sufficiently deep longitudinal dimension to appreciate country-specific trends in both trust and inequality, and above all, we can introduce country fixed effects to capture any time-invariant unobserved factor at the country level. Moreover, to identify a causal link from inequality to trust, we also rely on IV strategy. Namely, we construct a variable that predicts the country-level exposure to technological change – one of the most prominent explanations for inequality trends in recent decades is related to skill-biased technical change – based on the initial sector (2-digit) composition of the economy, the technological intensity of each sector, and the global valued added dynamics of the Information and Communication Technology (ICT) industry. A further novelty of the paper concerns the analysis of different dimensions of inequality, exploiting measures of both *static* inequality – from the traditional Gini index to the top income shares – and *dynamic* inequality – proxied by intergenerational income mobility, which is traditionally interpreted in terms of equality of opportunity.

According to our findings, inequality negatively affects generalised trust in wealthier countries, whereas the two variables are substantially unrelated in poorer countries. The latter result can be arguably related (at least in part) to larger measurement errors and mismeasurement of the income distributions of those societies. In developed countries, the relationship is both statistically and economically significant. According to our preferred

[6] Stated differently, trusting societies appear to perform well in almost any dimension, and the risk of bias due to an omitted variable (e.g., welfare institutions or culture) is large. The measurement of trust itself may reflect unobserved, country-specific factors. Indeed, Torpe and Lolle (2011) questioned the capacity of international surveys to capture the meaning of social trust equally well in all countries and suggest that comparisons between countries belonging to different geographic blocs and/or cultural settings should be interpreted with caution.

estimation, a 1-percentage point increase in the Gini index leads to a decrease of approximately 2 percentage points in the fraction of individual who believe that most people can be trusted. Similar results are obtained if we use top income shares instead of the Gini index. A tentative interpretation is that the relationship between inequality and trust is primarily driven by the concentration of income at the top of the distribution. Our results prove robust to the introduction of further control variables. Finally, we include a measure of intergenerational income mobility and its interaction with income inequality, and we find that both dimensions of inequality negatively affect trust and reinforce one another.

The remainder of the paper is organised as follows. In section 2, we review the literature. In section 3, we present the data and empirical strategy. The main results, robustness checks and refinements are discussed in section 4. Section 5 concludes.

2. Review of the literature

The existing empirical evidence on the relationship between inequality and trust can be grouped into two categories: the first is based on *cross*-country data, and the second is based on *within*-country data. Let us discuss them in turn.

Studies in the first category include Knack and Keefer (1997), Zak and Knack (2001), Bjørnskov (2006) and Leigh (2006a). All of these studies find a negative and statistically significant relationship between inequality and trust. However, they also share a common drawback, as they are based on cross-country correlation, thus running a risk of omitted variable bias. Indeed, cultural, social, political and/or institutional differences across countries – all factors that can not be credibly controlled for in a cross-section – may be correlated with both inequality and trust, thus generating a spurious correlation between the two. Reverse causality may also be at work. Bjørnskov (2006) and Leigh (2006a) correctly acknowledge the potential endogeneity issues; however, the IVs they propose – the size of mature cohorts and political ideology, respectively – are not completely satisfactory because they may *directly* affect trust.

Studies in the second category include Alesina and La Ferrara (2000 and 2002), Leigh (2006b) and Gustavvson and Jordahl (2008). In these studies, the relationship between inequality and trust is generally weaker than in cross-country analyses.[7] This result may have two opposite explanations. On the one hand, there may not be sufficient variation in the data, thus casting doubt on the suitability of within-country studies to investigate this issue.[8] On the other hand, the correlation may be weaker because within-country studies, implicitly controlling for cultural, social and institutional variables that vary at the country level, reduce the risk of capturing a spurious correlation. This, in turn,

[7] In Alesina and La Ferrara (2000 and 2002), the negative correlation vanishes when they control for racial heterogeneity. Leigh (2006b) does not find any statistically significant relationship between trust and inequality. The two variables are also uncorrelated in many of the specifications contained in Gustavvson and Jordahl (2008).

[8] Bergreen and Bjørnskov (2011) do not find a significant relationship despite the substantial variability across US states.

would cast doubt on the suitability of cross-country correlations.[9] Moreover, this second set of studies is not exempt from identification issues. The paper by Leigh (2006b) has the same drawbacks of cross-country studies, being based on a cross section. In contrast, Alesina and La Ferrara (2000 and 2002) adopt a panel structure. However, they measure the Gini index at the metropolitan area level and introduce fixed effects at the state level, thus leaving room for unobserved factors at the local level. For the same reasons, the IVs they propose – the number of municipal and township governments, the percentage of revenues from intergovernmental transfers and the share of the manufacturing sector – may well be correlated with unobserved local determinants of trust. The paper by Gustavvson and Jordahl (2008) represents a step forward in the identification of a causal nexus between inequality and trust. They employ Swedish panel data with trust measured at the individual level and the Gini index measured at the county level. Their results are based on both a panel with fixed effects at the county level and IV estimates where inequality is instrumented with international demand. However, potential concerns relate to the short duration of the panel (1994-1998), whereas inequality and cultural variables (such as trust) tend to move smoothly across time. Moreover, Sweden is traditionally characterised by a high level of trust and low levels of inequality relative to other countries, thus raising questions regarding the generalisability of their results.

In the next section, we describe our empirical strategy designed to address these concerns.

3. Empirical strategy and data

In contrast to previous cross-country studies, we adopt a panel approach, thus holding constant both stable country-to-country differences and changes in trust that equally affect all countries in the same year. The empirical specification is as follows:

$$Trust_{c,t} = \alpha + \beta\, Inequality_{c,t} + \delta\, X_{c,t} + \gamma_c + \rho_t + \mu_{c,t}$$

where $Trust_{c,t}$ is the level of trust in country *c* at time *t*, $Inequality_{c,t}$ is the measure of income inequality in the same country and the same year, and $X_{c,t}$ include time-varying controls (e.g., the log of GDP per capita). Finally, γ_c and ρ_t are fixed effects at the country and year level, respectively, and $\mu_{c,t}$ is the error term.

Our measure of trust is constructed using the WVS, covering five waves from the 1980s to the mid-2000s. Namely, respondents were asked, "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" Respondents who said "most people can be trusted" were coded as 1, while those

[9] In Alesina and La Ferrara (2000 and 2002), the weaker correlation may also be due to an attenuation bias. Indeed, they obtain an annual Gini index at the MSA level by interpolation and extrapolation, beginning from three census waves (1970, 1980 and 1990). They thus measure income inequality with some error, which could lead to underestimation.

who said, "you need to be very careful in dealing with people" were coded as 0. The data are then collapsed to the country level.[10] The measures of income inequality were drawn from other sources. Namely, we use the Gini index – from the World Bank's World Development Indicators Database – and top income shares – from the World Top Incomes Database, which has only recently been made available (Atkinson and Piketty, 2010). The Gini index is likely the most popular indicator of inequality and measures the extent to which the (overall) income distribution differs from perfect equality. Top income shares, in contrast, measure concentration at the top of the distribution. However, they may also significantly drive overall inequality. According to Atkinson (2007): "if we treat the very top group as infinitesimal in numbers, but with a finite share *S* of total income, then the Gini coefficient *G* can be approximated by $G^*(1-S)+S$, where G^* is the Gini coefficient for the rest of the population." Among the control variables, we include the log of the GDP per capita, average years of schooling, the fraction of immigrants over total population and the age index. Table 1 provides a brief description, descriptive statistics and the corresponding source for each variable. It is worth noting that these variables are highly correlated (see Table 2), and in particular, the GDP per capita arguably captures many dimensions of well being and societal progress.

A concern about the use of a panel analysis with country fixed effects is its potential inefficiency since our key variables (trust and inequality indices) have little longitudinal variance. Descriptive statistics of our data confirm that trust and inequality indices have much more variation across countries than over time, though the within variation is not negligible.[11] Concerning the latter point, Putnam (2000) reports some evidence on the decline of social capital, along several dimensions, in the US. Similar trends are also discernible in other countries. Moreover, OECD (2011) and Atkinson and Piketty (2010) highlight heterogeneous trend in inequalities across countries in the last decades. Therefore, the adoption of a long term perspective covering the period from the beginning of the 1980s to the mid-2000s allows us to have a sufficient variability also along the longitudinal dimension.

One caveat about the empirical specification described above is that concerns regarding endogeneity may persist, in spite of the introduction of country fixed effects. First, there may be time-variant omitted variables. For example, unobserved welfare reforms or socio-economic changes may affect both the level of inequality and the formation of trust. Second, there may be reverse causality: for instance, more trust may lead to larger welfare state and/or to better institutions and better-performing markets and these, in turn, may favour a more equitable income generation process. Moreover, measurement error in inequality measures may also result in a bias. To further address

[10] This measure is often referred to as *generalised* trust and is contrasted with *particularised* trust, where individuals only have faith in their in-group. On this point, see also the Banfield's (1958) famous study of a Southern Italian village in which individuals were connected by very strong bonds within families but not at all between families (the so-called 'amoral familism').

[11] The standard deviation of TRUST is 0.143 for the between component and 0.042 for the within component. The corresponding figures for GINI are 0.096 and 0.029, for TOP10 are 0.064 and 0.023 and for TOP01 are 0.033 and 0.016.

endogeneity, we adopt an IV strategy and use a proxy variable capturing Skill-Biased Technological Change (SBTC) as an exogenous driver of inequality.

One of the most prominent explanations for inequality trends in recent decades concerns SBTC (see Levi and Murnane, 1992; Acemoglu, 2002; Autor et al., 2006). The basic notion is that an exogenous burst of new information and communication technology (ICT) caused a rise in the demand for highly skilled workers that, in turn, led to a rise in wage inequality. Some empirical evidences confirm this hypothesis (Berman et al., 1998; Van Reenen, 2011; Jaumotte et al., 2013). Our instrument exploits the SBTC as driver of inequality. However, rather than measuring *current* technological endowments at the country level, we predict exposure to it by interacting three sources of variation that are plausibly exogenous with respect to the country trend in trust: (i) the initial sector composition (2-digit) of the country, (ii) technological coefficients capturing the sectoral dependence on ICT and (iii) the worldwide growth of the ICT industry. Formally, our instrument is as follows:

$$SBTC_{c,t} = \sum_{s} \frac{EMP_{c,s,1980}}{EMP_{s,1980}} \cdot \theta_s \cdot \log(ICT_t)$$

where $EMP_{c,s,1980}$ is the number of workers in sector *s* and country *c* in 1980 and $EMP_{s,1980}$ is the number of workers at the global level in the same sector and the same year. The technical coefficient θ_s measures for each sector *s* the fraction of ICT inputs – "office, accounting and computing machinery" and "computer and related activities" – over total consumption of intermediate goods and services; the technological coefficients are constructed on the basis of the input-output matrix for the US and refer to the mid-1990s. Finally, ICT_t is the global value added of the technological sector. *SBTC* can be interpreted as an approximation of each country's consumption of ICT inputs produced worldwide. The instrument was constructed using data from STAN – the OECD database for structural analysis – and we only consider the countries for which the data are nearly complete.[12] The identification assumption is that conditional on $X_{c,t}$ and country- and year-fixed effects, *SBTC* only affects trust through its effect on inequality. We believe that this is a reasonable assumption because the three terms used to construct the IV are plausibly exogenous with respect to the country trend in generalised trust.

4. Results

4.1 Main results

[12] The list of the countries, in alphabetical order, is: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom and the United States. Some countries have missing values in 1980, and these are imputed residually using information from the rest of the sample.

We begin our investigation of the inequality-trust nexus with a simple graphical representation in which we plot the regression of trust on both the Gini index and top decile share, net of year dummies. Figure 1 clearly shows a negative relationship between trust and the inequality indicators – although the Gini index exhibits substantial dispersion around the regression line. Much of the literature on inequality and trust is roughly based on evidence of this type.

In Table 3, we provide some further evidence on this relationship. The estimated coefficient for the correlation between inequality and trust is equal to -0.42 and is statistically significant (column 1). If we split the sample on the basis of GDP per capita, we find that the negative and significant correlation is confirmed for both the subsamples (columns 2 and 3), though the coefficient is larger for the subset of richer countries.[13] In the last three columns, we include fixed effects to capture any unobserved factor that is country specific.[14] The results change dramatically. The correlation between trust and inequality is no longer significantly different from zero for the entire sample (column 4) or the subsample of poor countries (column 5). On the contrary, we find an even stronger negative relationship for the subsample of wealthier countries (column 6).[15] This simple evidence highlights two important facts. First, unobserved country variables may drive the relationship between trust and inequality and failing to control for them may severely bias the estimates. Second, combining data from very heterogeneous countries is itself a source of bias. Indeed, the insignificance of the correlation between trust and inequality in poorer countries can be partly explained by measurement error. The Gini index and level of trust are likely measured with greater noise in those countries, and this leads to a downward bias and less efficient estimates. Moreover, mismeasurement of income distribution may be larger in poorer countries.[16] A further potential explanation for the absence of a significant relation in poor countries is that the within variation of the data is smaller.

In Table 4, we proceed by exploiting both the panel dimension and the IV estimates. For comparability between OLS and IV estimates and reasons of data availability, we are

[13] The wealthier countries – those with a GDP per capita above the median – are Argentina, Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States; the poorer countries – those with a GDP per capita below the median – are Albania, Azerbaijan, Bangladesh, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, China, Colombia, the Czech Republic, the Dominican Republic, Egypt, El Salvador, Estonia, Hungary, India, Iraq, Kyrgyzstan, Latvia, Lithuania, Macedonia, Mexico, Moldova, Poland, Peru, Romania, the Russian Federation, the Slovak Republic, South Africa, Ukraine, Uruguay, and Venezuela.

[14] The introduction of country fixed effects substantially increases the R-squared since those variables captures the between variation in the data. Moreover, a simple F test does not reject the joint significance of country dummies.

[15] Unfortunately, this type of exercise is not replicable when employing top incomes instead of the Gini index because top income data are primarily available for developed countries.

[16] In the WVS, respondents were asked to identify the income decile to which they belong. If the individuals were randomly sampled from the population and were familiar with income distributions of their countries, we would expect a uniform distribution of the individuals across deciles. However, according to our elaborations, certain differences arise and are larger in poorer countries. The implications of this misclassification are twofold. On the interviewer side, one may cast some doubt on the representativeness of the sample across deciles of the income distribution in poorer countries. On the respondent side, individuals in those countries may have a greater misperception of their position in the income distribution.

forced to restrict the analysis to a set of advanced economies belonging to the OECD. We start with a very parsimonious specification (including only GDP per capita among the control variables) and we add further controls in a stepwise fashion. Specifically, we include average years of schooling, the age index and the fraction of immigrants over total population. The choice of these further controls is driven by data availability and by the fact that they are plausibly correlated to both trust and inequality. Moreover, the richer the set of controls, the more likely is the exclusion restriction assumption. According to the OLS estimates, there is a negative relationship between inequality and trust and the coefficient is fairly stable across specifications. The IV estimates confirm the negative relationship, thus suggesting a causal link between the two variables (from inequality to trust). The first stage F-statistic of the excluded instrument allows us to reject the null hypothesis of a weak instrument (Stock and Yogo, 2005). On the basis of the IV estimates, a 1 standard deviation increase in the Gini index would entail a decrease in the level of trust equal to 70 percent of its standard deviation. Stated differently, a 1 percentage point increase in the Gini index leads to around 2 percentage point decrease in the share of individuals who believe "most people can be trusted". Therefore, the relationship is also economically sizeable. The IV estimates are larger in absolute values with respect to the OLS ones and a plausible explanation is the relevance of measurement errors which would lead to an attenuation bias.

One concern with the empirical findings discussed above is that the observed relationship may be driven by few outliers and/or non-representative countries. In Table 5 we report some robustness check to mitigate the role of influential observations. Specifically we exclude in each specification the country with the lowest (Portugal) and the highest (Norway) level of trust and the less (Austria) and more (United States) unequal societies, respectively. Consistently with the previous table we also report both OLS and IV estimates. The negative and significant relationship between trust and inequality is confirmed in all the specification. Moreover, the coefficient is fairly similar to that of the baseline specification.

4.2 The role of top incomes

In this subsection we use top income shares in place of the Gini index as measure of inequality. Specifically we use top decile and the top percentile income share as measure of income concentration.

Table 6 is divided in two panels, top panel for top decile income shares and bottom panel for top percentile income shares. In each panel with report both OLS and IV estimates for different specifications, with an increasing number of controls as done before.

According to our findings, top income shares are negatively and significantly associated to trust. As in the previous section, OLS are slightly downward biased for top decile income shares while they are pretty close to the IV estimates for top percentile income shares. A tentative explanation is that incomes at the very top of the distribution

are less susceptible of measurement errors and suffer less of individual incentives in reporting incomes (Atkinson and Piketty, 2010), thus attenuating the downward bias from measurement errors. The first stage F-statistic of the excluded instrument is well above 10. According to our preferred specification, a 1 percentage point increase in the top decile (percentile) income share leads to 1.5 (2.3) percentage point decrease in the share of individuals who believe "most people can be trusted".

Recalling the relationship between the Gini index and the top income shares mentioned above, we may conclude that the relationship between inequality and trust is primarily driven by the concentration of income at the top of the distribution.[17] In order to further corroborate this evidence, in Table 7 we jointly include the Gini index and the top income shares as determinants of trust. After controlling for top income shares, the coefficient of the Gini index is not statistically different from zero while the coefficients for top income share remain negative and highly significant. Though intriguing, this result should be interpreted with some caution given the high correlation between the two variables.

4.3 Inequality and intergenerational mobility

Income inequality is a static dimension of a society. However, inequality can also be examined from dynamic perspective. Namely, intergenerational income elasticity is a summary indicator that captures the extent to which individual income is correlated with his parental income in a given society. Examining different dimensions of inequality might provide further insights into the formation of trust.

To better understand this point, consider two societies with the same income distribution (i.e., identical static inequality). Let us now assume that in the first society, individuals inherit the economic positions of their parents, and income inequality for the children's generation is simply a reflection of income inequality in the parental generation. In this society there is no intergenerational income mobility. Let us assume, on the contrary, that the second society is more fluid: individual incomes do not depend on family background, and income inequality in each generation is independent of that of the previous generation. Overall, the two societies are equally unequal at any point in time, but they differ substantially in the nature of inequality and in how it is transmitted across generations. This has some implications for how inequality is viewed and perceived. The second society is arguably fairer, as the economic distance across individuals is reshuffled in each generation and the economic classes are less rigid. Ultimately, this difference is also likely to matter in terms of trust accumulation.

This idea is not totally new. Rothstein and Uslaner (2005) suggested the exploration of different dimensions of inequality. However, the distinct impact of income inequality

[17] The IV estimates using the Gini index upwardly revise those obtained via OLS, thus suggesting the existence of an omitted variable that is negatively related to trust and positively related to inequality (or vice-versa). Conversely, the magnitudes of the coefficients on the top income shares are roughly similar between OLS and IV.

and intergenerational mobility (and their potential interactions) has never been empirically investigated.[18] This lack of investigation is likely due to the lack of appropriate data to measure intergenerational mobility (which requires data covering at least two generations). However, a growing number of studies that have been recently published allow us to obtain some (comparable) cross-country evidence.[19]

The main drawback of using both static and dynamic measures of inequality is that we have to exclusively rely on cross-country correlations because cross-country trends in intergenerational mobility are not available. Moreover, even if they were available, it would be difficult to match them in a panel structure. Indeed, intergenerational mobility is difficult to associate with a particular year because it is estimated using permanent income (income over the life-cycle), in contrast with income inequality (which is measured using current incomes in a given year). Finally, note that intergenerational income elasticity is – at least to some extent – positively correlated with income inequality.[20] Bearing this caution in mind, we believe that the analysis of further dimensions of inequality is still worthy of investigation.

The results of pooled OLS regressions are reported in Table 8, which is divided into three panels, one for each dependent variable – Gini index, top decile share and top percentile share. We include intergenerational income elasticity as a further regressor – to examine whether static and dynamic measures of inequality have distinct effects on trust – and interacted with income inequality to examine whether the negative effect of inequality is reinforced in more immobile societies. According to these findings, the different dimensions of inequality always enter with a negative sign and are statistically significant when they are jointly included in the specification (first column of each panel). Moreover, the coefficient estimated for the interaction term is negative and highly significant in the second column – thus suggesting that the negative impact of inequality is more accentuated in more immobile societies – while it is not statistically significant in the third column, likely due to the collinearity induced when all of the regressors are jointly included in the specification.

The interpretation of the impact of intergenerational mobility clearly mirrors that of inequality. First, inequality generates social barriers across groups, thus hampering social ties and the formation of trust, and this effect is clearly even stronger in more immobile countries. Second, the perception of unfairness is likely more rooted in societies in which inequality is transmitted across generations, thus negatively affecting trust.[21] Third,

[18] Rothstein and Uslaner (2005) distinguish between income inequality and inequality of opportunity. However, in their empirical analysis, they do not investigate equality of opportunity as such, but they proxy it with the adoption of universal state welfare programs, which is a questionable assumption.

[19] For data on intergenerational income elasticities, see Corak (2006), Mocetti (2007) and the special issue on intergenerational mobility edited by the B.E. Journal of Economic Analysis and Policy (http://www.degruyter.com/view/j/bejeap.2007.7.2/issue-files/bejeap.2007.7.issue-2.xml).

[20] From a more technical perspective, the drawbacks of this analysis are twofold. First, we cannot introduce country fixed effects in the specifications, and therefore, we add certain controls to capture country-specific characteristics. Second, the simultaneous inclusion of the two dimensions of inequality may generate some collinearity concerns.

[21] It is widely believed that a high level of intergenerational mobility indicates greater openness, more equality of opportunity and social justice. It is worth noting that there is a latent difference between inequality of opportunity and

inequality may generate resource conflicts that, in turn, deteriorate trust. This sentiment is again more widespread in more immobile societies, where the reproduction of social classes may reinforce class consciousness and resource conflicts.

5. Conclusion

The relationship between inequality and trust has attracted the attention of many social scientists. Moreover, the recent economic crisis has generated renewed interest in the concentration of incomes and concerns regarding social cohesion and trust in others.

In this paper, we provide a reappraisal of country-level evidence on inequality and trust. In particular, we attempt to address the drawbacks of previous studies by exploiting the panel dimension of the data and adopting a new IV strategy. A further novelty of this paper is related to the analysis of different dimensions of inequality, exploiting measures of both *static* inequality – from the traditional Gini index to the top income shares – and *dynamic* inequality – proxied by intergenerational income mobility, which is traditionally interpreted in terms of equality of opportunity.

According to our findings, inequality negatively affects generalised trust in developed countries. The relationship is both statistically and economically significant. According to our preferred estimation, a 1 percentage point increase in the Gini index leads to a decrease of approximately 2 percentage points in the share of individuals who believe that most people can be trusted. Qualitatively similar results are obtained if we use top income shares instead of the Gini index. We also provide some suggestive evidence on the impact of intergenerational mobility and its interaction with income inequality. Overall, our results indicate that an unequal and immobile society generates high social barriers between social groups and reinforces the perceived unfairness of the income generation process, thus hampering the formation of trust. With respect to policy implications, measures aimed at reducing income inequality are also trust-enhancing, thus potentially leading to other favourable consequences for many economic outcomes.

intergenerational mobility, as the latter may also reflect preferences or other factors for which the individual can be held responsible (Swift, 2004; Roemer, 1998 and 2002).

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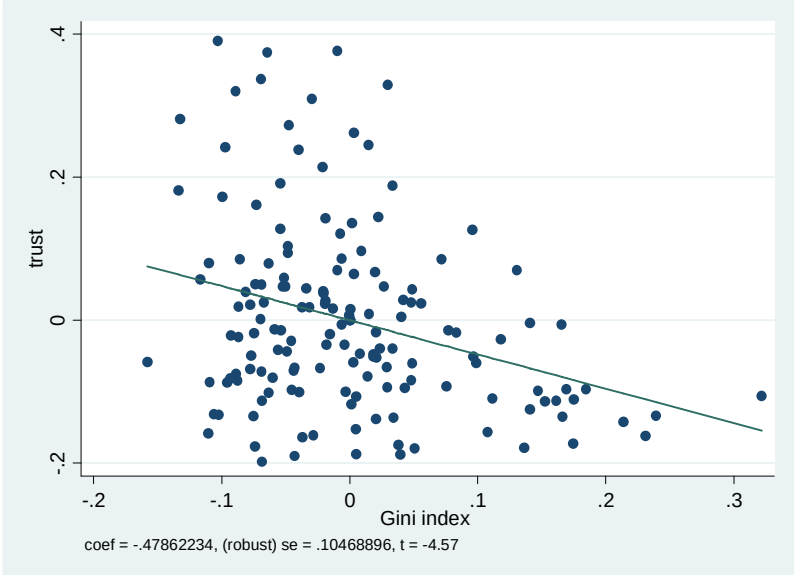
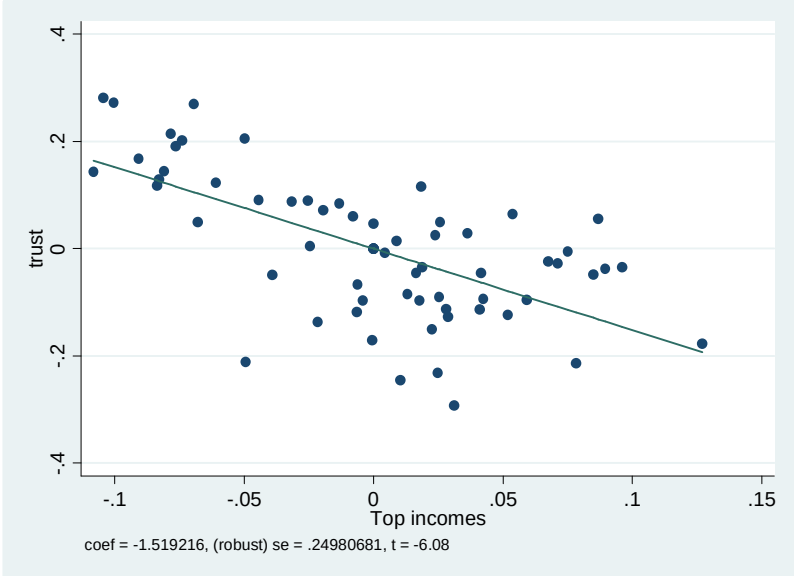
Figures

Figure 1. Cross-country correlation between trust and income inequality





Plots are the country-year residuals from an OLS regression pooling data from all waves of the WVS and including year fixed effects.

Tables

Table 1. Descriptive statistics

Variable	Description and source	Mean	St.dev.	Min	Max
TRUST	Share of individuals responding "Most people can be trusted" to the question "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?"; source: World Value Survey (all waves)	0.32	0.150	0.03	0.74
GINI	The Gini index measures the extent to which the distribution of income deviates from a perfectly equal distribution; a value of 0 represents perfect equality, while a value of 1 implies perfect inequality; source: World Bank	0.34	0.094	0.20	0.63
TOP10	Top decile income share; source: World Top Incomes Database, http://g-mond.parisschoolofeconomics.eu/topincomes	0.32	0.064	0.20	0.45
TOP01	Top percentile income share; source: World Top Incomes Database, http://g-mond.parisschoolofeconomics.eu/topincomes	0.09	0.034	0.03	0.18
IGE	Intergenerational income elasticity; a value close to 1 indicates high intergenerational immobility, while a value close to 0 indicates a very mobile society in which the individual's income does not strongly depend on his parental background; source: Corak (2006) supplemented by estimates for other countries published in the special issue on intergenerational mobility edited by the B.E. Journal of Economic Analysis and Policy	0.36	0.140	0.15	0.63
GDP	Log of GDP per capita in US dollars at purchasing power parity and constant prices; source: World Bank	8.80	1.287	5.72	10.68
YRSCH	Years of schooling (population over 15); data for missing years are obtained via interpolation and extrapolation; source: Barro and Lee (2010)	9.27	1.851	3.44	12.95
AGE	Ratio of individuals older than 64 to those aged 0-14; source: World Bank	0.62	0.311	0.08	1.44
MIGRANTS	International migrants as a percentage of the population; data for missing years are obtained via interpolation and extrapolation; source United Nations. http://esa.un.org/migration/index.asp	0.07	0.069	0.00	0.38
SBTC	Predicted skill-biased technological change based on initial sector (2-digit) composition of the country, the technological intensity of each sector, and world aggregate valued added of technological industry; source: STAN.	23.26	39.714	0.29	238.31

Table 2. Correlation matrix

	GINI	TOP10	TOP01	IGE	GDP	YRSCH	AGE
GINI							
TOP10	0.537						
	(0.000)						
TOP01	0.498	0.929					
	(0.000)	(0.000)					
IGE	0.370	0.284	0.212				
	(0.006)	(0.040)	(0.111)				
GDP	-0.213	0.178	0.063	-0.450			
	(0.008)	(0.153)	(0.588)	(0.000)			
YRSCH	-0.349	0.174	0.145	-0.382	0.472		
	(0.000)	(0.163)	(0.212)	(0.002)	(0.000)		
AGE	-0.523	-0.111	-0.138	-0.156	0.503	0.503	
	(0.000)	(0.373)	(0.234)	(0.231)	(0.000)	(0.000)	
MIGRANTS	-0.179	0.134	0.136	-0.377	0.493	0.518	0.172
	(0.073)	(0.288)	(0.247)	(0.003)	(0.000)	(0.000)	(0.073)

P-values in parentheses.

Table 3. Inequality and trust by group of countries

	(1)	(2)	(3)	(4)	(5)	(6)
	All countries	Poor countries	Rich countries	All countries	Poor countries	Rich countries
GINI	-0.423***	-0.217***	-0.471**	-0.137	0.201	-0.865**
	(0.092)	(0.077)	(0.234)	(0.153)	(0.186)	(0.370)
GDP	0.044***	-0.039**	0.157***	-0.011	0.019	-0.154**
	(0.010)	(0.018)	(0.033)	(0.034)	(0.036)	(0.065)
Country FE	NO	NO	NO	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	152	75	77	152	75	77
R-squared	0.417	0.486	0.502	0.942	0.929	0.953

The dependent variable is trust. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4. Inequality and trust: baseline estimates

	OLS				IV			
GINI	-0.852**	-0.830**	-0.838**	-0.868***	-2.169***	-2.134***	-2.123***	-1.852***
	(0.387)	(0.413)	(0.382)	(0.317)	(0.687)	(0.622)	(0.619)	(0.532)
GDP	-0.155**	-0.186	-0.191	-0.267**	-0.240***	-0.336**	-0.339**	-0.384**
	(0.067)	(0.132)	(0.127)	(0.130)	(0.091)	(0.165)	(0.165)	(0.153)
YRSCH		0.005	-0.003	-0.002		-0.011	-0.020	-0.015
		(0.016)	(0.020)	(0.016)		(0.025)	(0.033)	(0.023)
AGE			0.069	0.074			0.077	0.080
			(0.086)	(0.073)			(0.119)	(0.092)
MIGRANTS				1.643***				1.716**
				(0.543)				(0.682)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	62	60	60	60	62	60	60	60
R-squared	0.932	0.932	0.933	0.941	0.909	0.912	0.913	0.929
First stage F-statistics of excluded instrument					7.7	8.8	8.5	8.3

The dependent variable is trust. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5. Inequality and trust: robustness to outliers

	OLS				IV			
GINI	-0.814***	-0.969***	-0.868***	-0.753**	-1.964***	-1.546***	-1.852***	-1.373*
	(0.316)	(0.285)	(0.317)	(0.329)	(0.546)	(0.500)	(0.532)	(0.721)
GDP	-0.255*	-0.428***	-0.267**	-0.266**	-0.393**	-0.501***	-0.384**	-0.335**
	(0.133)	(0.089)	(0.130)	(0.130)	(0.160)	(0.111)	(0.153)	(0.157)
YRSCH	-0.008	-0.009	-0.002	0.001	-0.022	-0.016	-0.015	-0.005
	(0.016)	(0.016)	(0.016)	(0.015)	(0.025)	(0.020)	(0.023)	(0.019)
AGE	0.119*	0.106	0.074	0.048	0.115	0.111	0.080	0.051
	(0.069)	(0.070)	(0.073)	(0.070)	(0.104)	(0.082)	(0.092)	(0.078)
MIGRANTS	1.531***	2.182***	1.643***	1.822***	1.643**	2.229***	1.716**	1.877***
	(0.518)	(0.504)	(0.543)	(0.520)	(0.671)	(0.578)	(0.682)	(0.590)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Exclusion of:	Portugal (low trust)	Norway (high trust)	Austria (low Gini)	US (high Gini)	Portugal (low trust)	Norway (high trust)	Austria (low Gini)	US (high Gini)
Observations	58	57	59	56	58	57	59	56
R-squared	0.935	0.949	0.940	0.947	0.917	0.945	0.929	0.942
First stage F-statistics of excluded instrument					8.6	8.8	8.3	3.6

The dependent variable is trust. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 6. Top incomes and trust

	OLS				IV			
				(a) Top decile				
TOP10	-1.141***	-1.393***	-1.406***	-1.370***	-1.446*	-1.675*	-1.648*	-1.503*
	(0.411)	(0.503)	(0.492)	(0.462)	(0.856)	(0.955)	(0.937)	(0.871)
GDP	-0.059	-0.091	-0.094	-0.162	-0.039	-0.085	-0.089	-0.158
	(0.095)	(0.097)	(0.097)	(0.107)	(0.116)	(0.104)	(0.103)	(0.114)
YRSCH		-0.019	-0.023	-0.021		-0.023	-0.027	-0.023
		(0.015)	(0.016)	(0.014)		(0.018)	(0.021)	(0.018)
AGE			0.032	0.030			0.036	0.032
			(0.079)	(0.074)			(0.083)	(0.077)
MIGRANTS				1.362***				1.354***
				(0.421)				(0.439)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	57	57	57	57	57	57	57	57
R-squared	0.948	0.950	0.950	0.955	0.947	0.949	0.950	0.955
First stage F-statistics of excluded instrument					40.7	20.2	18.6	17.9
				(b) Top percentile				
TOP01	-2.174***	-2.737***	-2.742***	-2.581***	-2.138*	-2.487*	-2.477*	-2.253*
	(0.605)	(0.654)	(0.661)	(0.663)	(1.229)	(1.339)	(1.317)	(1.360)
GDP	0.032	0.006	0.006	-0.036	0.030	-0.005	-0.005	-0.053
	(0.114)	(0.116)	(0.117)	(0.125)	(0.140)	(0.128)	(0.127)	(0.146)
YRSCH		-0.027*	-0.026*	-0.025*		-0.024	-0.023	-0.021
		(0.014)	(0.014)	(0.013)		(0.019)	(0.019)	(0.018)
AGE			-0.006	0.003			-0.003	0.007
			(0.054)	(0.053)			(0.053)	(0.052)
MIGRANTS				0.700*				0.770
				(0.408)				(0.547)
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	62	62	62	62	62	62	62	62
R-squared	0.946	0.950	0.950	0.951	0.946	0.950	0.950	0.951
First stage F-statistics of excluded instrument					12.1	9.1	11.5	12.3

The dependent variable is trust. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 7. Inequality, top incomes and trust

	(1)	(2)	(3)	(4)	(5)	(6)
GINI	0.152	0.120	0.162	-0.203	-0.104	-0.117
	(0.242)	(0.268)	(0.273)	(0.160)	(0.203)	(0.228)
TOP10	-1.784***	-1.226***	-1.210**			
	(0.265)	(0.405)	(0.487)			
TOP01				-3.125***	-2.373***	-2.782***
				(0.583)	(0.472)	(0.551)
GDP	0.031**	0.088	0.055	0.029***	0.044	0.026
	(0.015)	(0.064)	(0.072)	(0.010)	(0.053)	(0.061)
CONTROLS	NO	NO	YES	NO	NO	YES
Country FE	NO	YES	YES	NO	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	61	61	60	67	67	66
R-squared	0.558	0.948	0.949	0.517	0.952	0.953

The dependent variable is trust. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8. Income inequality, intergenerational mobility and trust

	(a) Gini Index		
GINI	-0.966***	-0.309	-2.234*
	(0.293)	(0.453)	(1.099)
IGE	-0.532***		-1.381*
	(0.131)		(0.709)
IGE×GINI		-1.543***	2.730
		(0.413)	(2.210)
CONTROLS	YES	YES	YES
Year FE	YES	YES	YES
Observations	53	53	53
R-squared	0.674	0.656	0.685
	(b) Top decile share		
TOP10	-1.167***	-1.043***	-2.062***
	(0.326)	(0.372)	(0.627)
IGE	-0.280**		-1.365
	(0.137)		(0.827)
IGE×TOP10		-0.704*	3.314
		(0.386)	(2.369)
CONTROLS	YES	YES	YES
Year FE	YES	YES	YES
Observations	52	52	52
R-squared	0.748	0.741	0.761
	(c) Top percentile share		
TOP01	-2.159**	-1.614	-3.370***
	(0.841)	(1.083)	(1.030)
IGE	-0.336**		-0.622*
	(0.144)		(0.331)
IGE×TOP01		-2.601*	3.548
		(1.376)	(2.922)
CONTROLS	YES	YES	YES
Year FE	YES	YES	YES
Observations	57	57	57
R-squared	0.707	0.687	0.714

Controls include GDP per capita, years of schooling, age index and the fraction of immigrants over total population. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1