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ABSTRACT

Instrumental arguments linking inequality to sustainability often suppose a negative relationship between inequality and social cohesion, and empirical studies of inequality and social trust support the assumption. If true, then redistribution should increase levels of social cohesion and thereby ease the implementation of policies that require collective action to achieve shared benefits. However, an examination of the data suggests that at least part of the relationship may be explained by income level, rather than income distribution, suggesting that growth, rather than redistribution, may achieve the same goal. This paper tests for the possibility and suggests that income is indeed important in explaining differences in levels of social trust. However, the effect of income level is insufficient to explain all of the dependence on income inequality; both income level and income distribution are correlated with social trust. The analysis is done at the income decile level using individual response data from the World Values Survey. While the analysis is limited by the availability and reliability of the underlying data, the results suggest that neither redistribution nor growth alone is sufficient to raise a low-trust country to a position of medium or high trust. Rather, using the parameters estimated in this paper, a combination of growth with narrowing income distributions could, over a period of perhaps two decades, produce a significant change in levels of social trust.

CONTENTS

1. INTRODUCTION

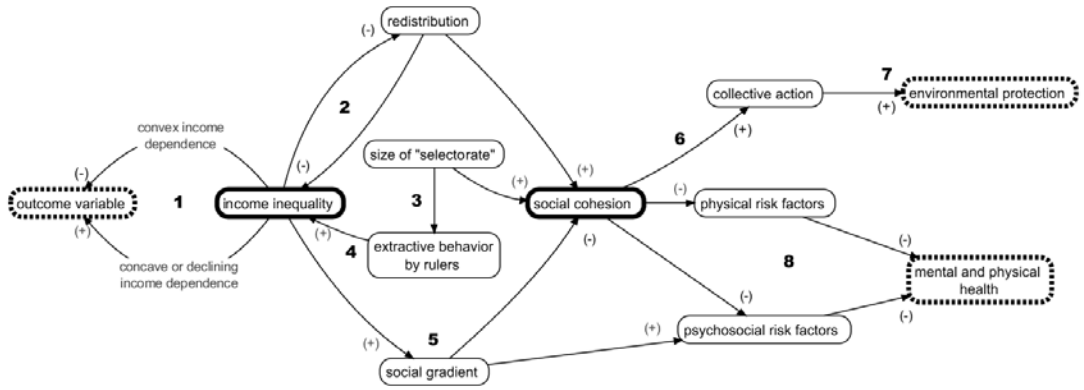
While sustainability is a contested concept (Jacobs 1999), most who use the term agree that it has both an environmental and a social dimension, and that the social content of sustainability emphasizes equity (Anand and Sen 2000; Bartelmus 1994; Common 1995; World Commission on Environment and Development 1987). Exploring the relationship between inequality and sustainability, as in this paper, may therefore seem trivial; they are related by definition. However, equality and equity are not the same, and equality—of incomes, wealth, access to resources, or other concrete thing—can be measured objectively, while equity, which is subject to social norms and personal judgments, cannot. Moreover, incorporation of equity and inequality concerns within sustainability is sometimes urged on normative grounds (Pelletier 2010), and sometimes on instrumental grounds (Boyce 2008), and either the normative or instrumental arguments can be analyzed and challenged.

This paper explores instrumental arguments that link income inequality to social and environmental outcomes of relevance to sustainability; that is, it asks whether inequality contributes to sustainability either positively or negatively. A literature review of inequality and sustainability finds that a possible inverse relationship between income inequality and social cohesion underpins prominent theoretical arguments for how inequality affects environmental and social outcomes (Uslaner 2002; Wilkinson and Pickett 2007; Boyce 2008). Using income decile data and a measure of social trust this paper tests whether the purported effect can be explained solely as a function of income, rather than income distribution per se, and concludes that both income level and incomes inequality contribute to explaining differences in levels of social trust.

1.1 Inequality and sustainability

Different authors have proposed a variety of mechanisms linking income inequality to environmental and social outcomes. A selection is illustrated in Figure 1. Several of the links in the figure have been contested; conflicting views are acknowledged in the text.

Figure 1: Links between income inequality, social cohesion, and environmental and social outcomes



Sources: 1. Mathematical necessity. 2. Bénabou (2000). 3. Bueno de Mesquita et al. (2003); Morrow et al. (2008). 4. Chakravorty (2006). 5. Uslaner (2002); Bjørnskov (2006). 6. Boyce (2008); Uslaner (2002). 7. Boyce (2008). 8. Kawachi and Kennedy (1999); Wilkinson and Pickett (2006); Wilkinson (1996); Jen et al. (2010).

One of the most important mechanisms, Item 1 in Figure 1, is hardly mechanical at all. While not immediately intuitive, it is well known that if some social or environmental variable, such as pollutant emissions, increases with income at a declining rate (that is, the curve of the relationship is convex), then an increase in inequality will, of necessity, lead to a decline in

the aggregate value of the variable, while the opposite is true for goods for which demand either grows at an increasing rate or declines with rising income. The intuition is that, for a convex (downward-bending but increasing) curve, an increase in inequality, which increases the number of people at low incomes, where consumption is low, and the level of the top income, where income is high but saturating; the net effect is to reduce the number of people in the most responsive, middle, part of the curve. The remaining Items 2-8 in Figure 1 either seek to explain income inequality or identify factors linking inequality to social and environmental variables.

Bénabou's theory (Item 2 in Figure 1) explains persistent low and high-inequality equilibria, as exemplified by Western Europe on the one hand and the United States, the United Kingdom, Australia, and New Zealand (the so-called "Anglo-Saxon countries) on the other (Bénabou 2000). Chakravorty (2006) offers a theory of inequality that explains both persistence and change; a part of his theory is shown in Item 4 in the figure. Kemp-Benedict (2011) combines a theory of political regimes (Bueno de Mesquita et al. 2003; Morrow et al. 2008) with Chakravorty's theory to add a political explanation for extractive behavior by elites (Item 3 in the figure). The theories of Bénabou and Chakravorty share space in a crowded field, but they stand out because of their successful explanation of one of the most prominent and perplexing features of income inequality—persistence punctuated by transitions to either a new steady level or to a period of gradually rising or falling inequality.

The remaining connections illustrated in Figure 1 link inequality (typically either income or wealth inequality) to social and environmental variables. Supporting Item 5, Uslaner (2002) explores correlates of and explanations for social trust and concludes that high income inequality is significantly and consistently correlated with lower levels of social trust. Bjørnskov (2006; 2008) considers several confounding variables (but not income level, as in this paper), and his results support Uslaner's conclusion. Some authors question whether social trust data are comparable across countries (Torpe and Lolle 2010) or measure trust of any sort at all (Hardin 2004). In a review, Nannestad (2008) argues that the data are meaningful, but problematic. While comparability matters for the analysis in this paper, definitional debates over what can properly be called "trust" are less important, as Uslaner has shown that responses to social trust questions are correlated with variables related to social cohesion and, using panel data, that responses to social trust survey questions are persistent at an individual level.

Boyce argues that inequality is negatively related to environmental protection (1994; 2008). Among other mechanisms, he suggests that social cohesion is necessary for environmental protection, which is shown as Items 6 and 7 in (Boyce 1994). This thesis derives from a result with strong empirical and theoretical support, that generalized, or social, trust, is essential for overcoming collective action problems (Ostrom 1998; Rothstein 2005). Nevertheless, evidence for Boyce's thesis is mixed. In support of the thesis, Holland et al. (2009) show that income inequality is correlated with high rates of biodiversity loss. However, Scruggs (1998) finds, on both theoretical and empirical grounds, that inequality could either contribute to or detract from environmental protection, a conclusion supported by Baland and Platteau (1999).

Within the fields of public health and epidemiology, the relative income hypothesis of Wilkinson (1996), Item 8 in Figure 1, is furiously debated. Briefly, the hypothesis is that the negative impact of inequality on health that has been observed in international data is due to the direct influence of inequality itself, and not simply a compositional effect as originally argued (Rodgers 1979; Wilkinson 1990; Wilkinson 1992). Some critics argue that Wilkinson and Pickett, the most prominent defenders of the hypothesis (Wilkinson and Pickett 2007) inappropriately use national level data to draw conclusions about individual responses (Jen et

al. 2009; Gravelle 1998); supporters counter that multilevel analysis produces results consistent with the hypothesis (Subramanian and Kawachi 2004). Other critics claim that the purported effect disappears when variables are added to the model (Lynch et al. 2004; Mellor and Milyo 2001), while Wilkinson and Pickett respond that the additional variables might, as the critics argue, be confounders, but might also be mediating, or pathway, variables that their theory anticipates (Wilkinson and Pickett 2006). In spite of heated debate, most academic critics do not reject Wilkinson and Pickett's underlying hypothesis that social position can influence health status, separate from purchasing power; indeed, one of their critics presents supporting evidence of a link between social trust and health (Jen et al. 2010). However, there appears to be consensus among the critics that income inequality—Wilkinson and Pickett's preferred explanatory variable—is a poor substitute for the real culprit, inequality in social status (Goldthorpe 2010; Lynch and Smith 2002; Deaton 2002).

The studies summarized in Figure 1 suggest that, aside from the purely mathematical effect of curvilinear income dependence, instrumental arguments relating inequality to sustainability outcomes rest heavily on the claim that inequality affects social cohesion. This paper focuses on that key relationship.

1.2 Composition and pollution

The mechanisms in Figure 1 fall broadly into two categories: the mathematical effect of summing the result of a curvilinear dependence of some social or environmental variable on income (Item 1) and the more or less direct response to living in an equal or unequal society (most of the other items). Subramanian and Kawachi (2004) call these the "composition" and "pollution" effects. Contrary to the thesis of Mora (2000), envy, although it may be present, is not advanced to explain the pollution effect. Instead, pollution effects can arise from lack of familiarity between people with very different incomes and levels of wealth (Uslaner 2002), perceived lack of agency (Uslaner 2002), differences in political power (Boyce 2008), belief that the distribution of rewards is illegitimate (Chamlin and Cochran 2006; Lenard 2010), or the external impact of private consumption (Boyce 2008; Hirsch 1976).

Writers on sustainability emphasize the pollution effect from income inequality, but the composition effect is also important. It is a real and measurable connection between changes in income inequality and policy-relevant outcomes, and not, as Gravelle (1998) has claimed, merely a "statistical artifact". However, the appropriate policy response to a composition and a pollution effect are not the same. Importantly, composition effects respond to targeted public spending—e.g., spending on health—and distribution-neutral growth, while pollution effects typically do not, unless the targeted spending has broad spillover effects. This paper attempts to separate composition from pollution effects on levels of social trust.

2. THEORY

Following Uslaner (2002) and Bjørnskov (2006), this paper takes the answer to the survey question, "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" from the World Values Survey (2009; 2011) as a measure of generalized, or social, trust. Respondents can answer either that "Most people can be trusted" or "Can't be too careful". (They can also choose not to answer the question.) The analysis in this paper uses individual response data, as Jen et al. do in their study of social trust and self-reported health (Jen et al. 2010). The individual response data in the World Values Survey reports an income range for respondents. Nominally, the ranges are income deciles, suitable for a study of correlates of social trust at the income decile level. In fact, for some countries the income ranges are clearly not deciles. As discussed in the next

section, the analysis uses data only for those countries that appeared to properly code income as deciles.

Uslaner (2002) provides a graph (Figure 8-1 on page 231) plotting trust against the Gini index for countries that do not have a Communist legacy. The Gini index measures income inequality, and increases from zero (if everyone has the same income) to one (where one person takes all of the income). There is a clear downward trend to the data, which is supported by the reported statistics, a decline of 1.1 percentage points in the percentage of respondents saying that most people can be trusted with each percentage point increase in the Gini coefficient, with an *r*-squared statistic of 0.47. However, upon closer inspection it appears that the graph is dominated by two clusters of countries, a high-trust, low-inequality cluster that is mostly composed of high-income countries and another low-trust, high-inequality cluster mostly composed of low-income countries. Thus the remarkably strong relationship that Uslaner observed might be due to differences in income rather than income inequality. Furthermore, if trust depends on differences in income at the national level, then it might also depend on income level within countries. In the terminology of Subramanian and Kawachi, any residual dependence on income inequality might be due to composition effects, rather than "pollution" effects; that is, social trust may depend on individual purchasing power and command over resources, rather than the level of inequality in the surrounding society. The analysis attempts to disentangle the different contributions of the overall level of development, as measured by per capita GDP; absolute income within countries, as measured by income deciles (the composition effect); and aggregate income inequality (the pollution effect).

2.1 Model specification

Each country *c* has data on income and trust at the decile level. Deciles are constructed (conceptually) by ordering national population by income, from lowest to highest, and then dividing that sequence of people into ten equal parts, labeled by i = 1,...,10. Thus the population within each decile is 10 percent of the total population. The share of total national income in each decile is denoted dc,i; these are the data reported in income distribution statistics. Because deciles are computed from data ordered by income, each succeeding decile receives a larger proportion of national income than the preceding decile. As a measure of social trust, $n_{c,i}$ is the number of people in decile *i* in country *c* answering "Most people can be trusted" to the social trust question, out of a total of $N_{c,i}$ respondents. The model is,

$$\ln\left(\frac{n_{c,i}}{N_{c,i}-n_{c,i}}\right) = A+(\alpha-\beta)\ln\bar{y}_c+\gamma I_c+\beta\ln y_{c,i}\,, \qquad (1)$$

where I_c is an aggregate national inequality indicator—this paper uses the Gini coefficient—$\bar{y}_c$ is national mean income, and $y_{c,i}$ is per capita income within each decile. The function on the left-hand side of the equation is a logit transformation. The logit is the inverse of the s-shaped logistic curve, and in Equation (1) it transforms the bounded proportion $\pi_{c,i}$, which must lie between a value of zero and one, to a variable that can take any value on the real line, from negative to positive infinity.

Income within each decile $y_{c,i}$ is calculated from decile income shares and mean income as

$$y_{c,i} = \frac{d_{c,i}P\bar{y}_c}{P/10} = 10\,d_{c,i}\bar{y}_c\,. \qquad (2)$$

In this equation, P, which cancels out between the numerator and denominator, is the national population. Substituting for $y_{c,i}$ in Equation (1) using Equation (2) gives

$$\ln\left(\frac{n_{c,i}}{N_{c,i}-n_{c,i}}\right)=(A+\beta\ln 10)+\alpha\ln y_c+\gamma I_c+\beta\ln d_{c,i}\ . \tag{3}$$

Absorbing the constant term β ln10 into the constant A, the model becomes

$$\ln\left(\frac{n_{c,i}}{N_{c,i}-n_{c,i}}\right)=A+\alpha\ln y_c+\gamma I_c+\beta\ln d_{c,i}\ . \tag{4}$$

Equation (4) can be tested as a generalized linear model (GLM) with a binomial distribution and a logit link function (Lindsey 1997). Moreover, it is a multi-level model, with data at two levels: national (mean income, income inequality) and decile (income share, trust).

The decile data were collected using national surveys carried out by different surveyors. Also, as shown below, dependence of trust on income decile varies from country to country. The error structure of Equation (4) may therefore vary from one country-year combination to another. The analysis assumes the following structure,

$$\ln\left(\frac{n_{c,i}}{N_{c,i}-n_{c,i}}\right)=(A+a_c)+\alpha\ln y_c+\gamma I_c+(\beta+b_c)\ln d_{c,i}+\varepsilon_{c,i}\ , \tag{5}$$

where a_c, b_c, and $\varepsilon_{c,i}$ are all normally-distributed variables with zero mean. That is, the analysis assumes that country-specific intercepts and decile coefficients differ due to random, rather than systematic effects.

Equation (5) is a generalized linear mixed model (GLMM) (Faraway 2006). It properly captures the binary nature of the trust data, and accounts for non-systematic differences between countries and national surveys through the error structure.

3. METHODS AND DATA

The analysis tests Equation (5) using the R statistical software version 2.13.0 (R Development Core Team 2011) using the glmer() function in the lme4 package version 0.999375-39, which estimates GLMMs. The lme4 package is the most recent version of lme, developed and maintained by Bates and colleagues (Pinheiro and Bates 2000). Purchasing power parity-adjusted GDP at constant 2005 international dollars from the World Bank World Development Indicators (World Bank 2011) provide a measure of per capita income. For income deciles and Gini coefficients the analysis uses data from the World Income Inequality Database version 2c (WIID2c) (UNU-WIDER 2008). Trust data are compiled from decile-level counts of people who answered "Most people can be trusted" or "Can't be too careful" to the trust question in the World Values Survey (WVS) waves 3 and 4, omitting any deciles with no responses to the trust question.

Income distribution data are notoriously challenging to work with. The WIID2c database typically has multiple surveys for each country-year combination. Wherever possible, this analysis uses data on gross income before taxes and transfers, selecting data with the highest quality score. Distributional data for countries and years are matched to the WVS data, for country and year combinations that differ by at most two years. For example, a WVS survey was carried out in South Africa in 1996, but no inequality data were available for that year; instead, the data set contains the values for 1997. All WIID2c and WVS data in the set

differed by at most one year except for New Zealand (1996 in the WIID2c database, and 1998 in the WVS database).

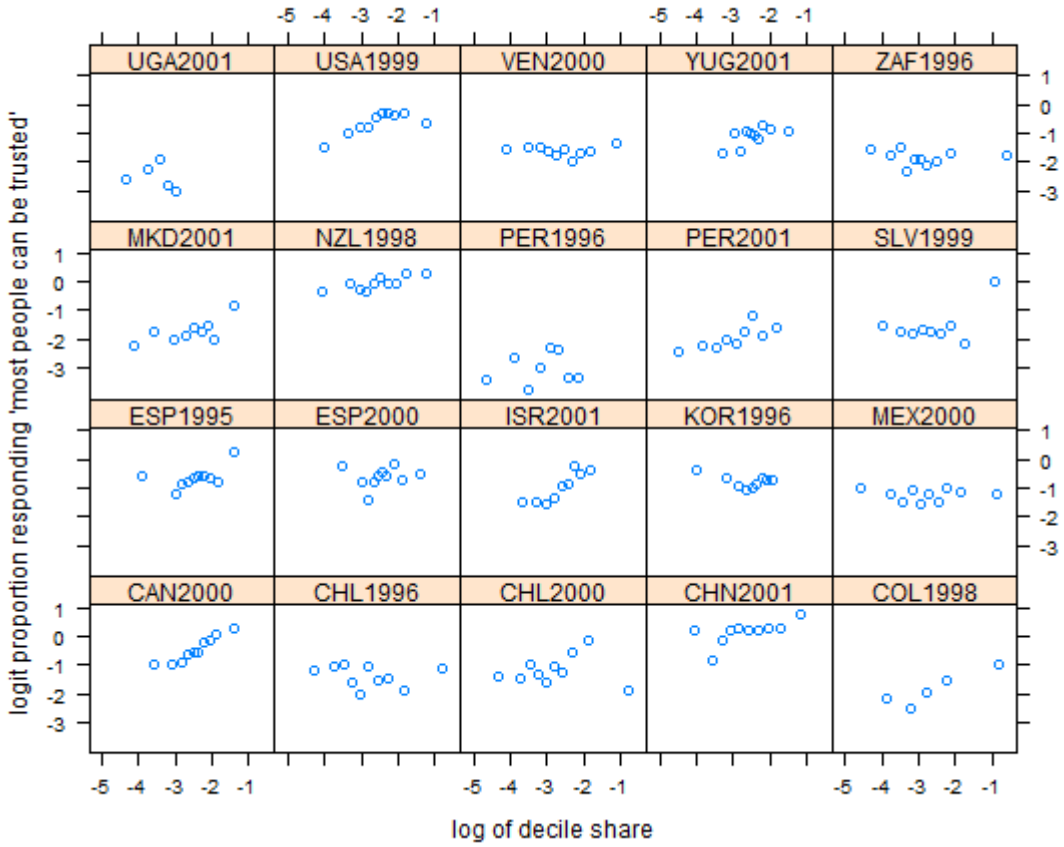
The income groups in the WVS are supposed to be deciles, but some of them clearly are not. For example, the income scale for Algeria (codes 12001-12010) is in even steps of 10,000 dinar per month (World Values Survey Association 2011), which is implausible as a set of deciles. Also, although codes are provided for each income scale, some surveys did not report which income scale they used. The data set for this paper omits any observations that did not report the code for the income scale, and any income scales that could not plausibly represent income deciles. Even in this case, the decile ranges must, of necessity, have been computed from an income survey for a year prior to the World Values Survey, but the WVS does not report the year for which the decile ranges were calculated.

After these procedures the data set contains 183 decile-level observations, for 20 country-year combinations: Canada in 2000, Chile in 1996 and 2000, China in 2001, Colombia in 1998, Spain in 1995 and 2000, Israel in 2001, South Korea in 1996, Mexico in 2000, Macedonia in 2001, New Zealand in 1998, Peru in 1996 and 2001, El Salvador in 1999, Uganda in 2001, USA in 1999, Venezuela in 2000, Yugoslavia in 2001, and South Africa in 1996. While small, this set of countries ranges from low to high income and includes both relatively egalitarian and non-egalitarian countries.

As shown in Figure 2, while in many countries the proportion of people responding “Most people can be trusted” to the trust question tends to rise with income, in some countries the rate is nearly flat, or even negative. This variability could be due to many factors. While some of those factors may be systematic, rather than random, for this analysis the slopes are treated as random effects in a mixed model, as discussed in the previous section, and as shown in Equation (5).

Beyond problems with data lie the general problems with social trust studies identified in the survey by Nannestad (2008): endogeneity, omitted variable bias, and bias from unobserved heterogeneity. Of these, omitted variable bias is least problematic. Indeed, the purpose of this paper is to ask whether the omission of income in previous studies might give misleading results. In turn, this study omit variables that have been considered in other studies, including cultural and religious fragmentation, because it focuses on the specific question of whether the observed dependence on income inequality (that is, relative income) may actually be due to an absolute income dependence. Unobserved heterogeneity is addressed by using a mixed model with random effects, as explained above. The endogeneity problem remains: if more equal societies are more trusting, but more trusting societies also build institutions and adopt norms that foster greater equality, then the influences pass in both directions. The data set does not have sufficient time-series data to test for endogeneity.

Figure 2: Social trust vs. within-country income



Source: Author's analysis.

4. ANALYSIS

The analysis regresses Equation (5) on the data described in the previous section with the lme4 R package. The package solves GLMM problems using an adaptive Gauss-Hermite numerical integration procedure. The accuracy of the estimation depends on the number of points at which the integrand is evaluated. The analysis uses four points; adding more points did not change the parameter estimates. This gave the results in Table 1. As seen in the table, log income is marginally significant (Pr = 0.07), while log decile income is highly significant (Pr < 0.001). Interestingly, the estimated parameter values are almost identical (0.26 and 0.24), suggesting that there is no overall effect of economic level separate from income variations within the country. The Gini coefficient is significant at the 95 per cent level (Pr = 0.03).

Table 1: Parameter estimates for the full model

	Estimate	z	Pr
log $\overline{y}_c$	0.26	1.8	0.07 (.)
log $d_{c,i}$	0.24	3.5	<0.001 (***)
Gini	-2.64	-2.1	0.03 (*)
Intercept	-1.80	-1.0	0.30

The GLMM procedure does not provide an *R*-squared statistic. Instead, an ANOVA table comparing the model with and without the Gini coefficient tests the significance of inequality relative to a model from which it is excluded. As seen in Table 2, the addition of the Gini coefficient contributes significantly (Pr = 0.05) to the explanatory power of the model. Also, the model with the Gini coefficient has a higher log likelihood and a lower Akaike information criterion (AIC) score than the model without the Gini coefficient, which each indicate a better fit.

Table 2: ANOVA table comparing model with and without Gini coefficient

	AIC	Log likelihood	Chi-squared	DF	Pr
Without Gini	351.3	-169.6			
With Gini	349.4	-167.7	3.89	1	0.048 (*)

Coefficients in logistic models are not as intuitive as ordinary least squares (OLS) coefficients, because they lead to changes in odds ratios rather than directly to changes in the variable of interest. However, as a simple estimate, if initially the odds are even—that is, half of respondents say that they trust others, while the other half say that they do not—then dividing the change in the odds ratio by four gives the approximate change in the response rate. Thus, using the figures in Table 1, a change of 0.05 in the Gini coefficient (comparable to the difference between New Zealand and China circa 2000) is associated with a 13 percent decline in the odds ratio for social trust. Dividing that by four shows that it corresponds to a 3.3 percentage point decline in the reported level of social trust relative to even odds. Similarly, a 10 percent increase in income is associated with a 0.6 percentage point rise in trust.

5. DISCUSSION

The results presented in Table 1 and Table 2 suggest that trust is affected both directly by income and also by inequality. Trust rises with income, but with a concave shape; trust also falls with rising income inequality. We therefore reject the hypothesis—for an admittedly limited data set—that the observed negative relationship between trust and income inequality is due solely to a correlation between income and inequality between countries and a composition effect within countries, rather than the contextual effect of living in a more or less equal country.

The coefficient of each of the explanatory variables in the regression is statistically significant (although income is only marginally significant), but the question remains whether they are substantively significant. That is, whether over a plausible range of values the explanatory variables contribute to meaningful differences in levels of trust. The mode of the trust distribution is close to 0.3. To raise a country from a trust level of 0.3 to 0.4 requires a change in the log odds ratio of 0.44. Dividing that by 0.26 (the coefficient for log income) and exponentiating gives 5.4, meaning that a country would have to increase its income more than five-fold to gain an improvement based solely on income using the parameter estimates in Table 1. Such an increase would take over 30 years at a 5 per cent annual growth rate, and half a century at a more realistic 3 per cent annual growth rate. The required change in the Gini coefficient is -0.17, slightly more than the difference circa 2000 between Spain—a relatively egalitarian country, as are most Western European countries—and Venezuela—one of the most unequal countries in the world at that time. Either of these differences would be substantial and transformative. These figures therefore suggest that neither inequality by itself

nor income growth by itself is substantively important for determining differences in levels of social trust. However, stable growth, extended over perhaps two decades, combined with an increasingly equal income distribution could, using the parameter estimates in Table 1, lead to meaningful changes in social trust. A two-decade time span is a reasonable time scale for sustainability policy planning, so a combined policy of growth with narrowing income distributions does appear substantively significant.

6. CONCLUSION

The results support the contention that income inequality is negatively related to social trust. Moreover, the relationship cannot be explained solely by differences in income, although rising incomes do contribute to higher levels of social trust. After accounting for income, income distribution contributes significantly to explaining differences in levels of social trust between countries.

The analysis in this paper is limited. Carrying out a multi-level analysis using income and trust data at the level of income deciles restricts the analysis to a small data set, consisting of only twenty country-year combinations. The small size of the data set means that we cannot explore potential endogeneity problems. Moreover, the data themselves are plagued with problems of comparability and interpretation. Bearing this in mind, the main recommendation is that future analyses should include income as an explanatory variable, because it partly, but not fully, accounts for the observed dependence on income inequality. A further limitation of the analysis is that it is static. While three of the countries had data for two different years, that is insufficient to form a panel, and so the analysis says nothing about dynamics. Uslaner (2002) argues that trust, while mostly stable, can change gradually due to the life-history of cohorts within a society. Thus, if income and income distribution are correlated with trust, the way in which they change over people's lives, and not simply the magnitude and direction of change, most likely matters for social trust. Indeed, Uslaner omitted formerly Communist countries from his graph because, although they had for a time very low levels of inequality, the way those levels were achieved left the countries with low levels of social trust. Furthermore, the analysis only considers income—either income level or distribution—as an explanatory factor. Other factors affect social trust, including institutions, social norms, and various types of fragmentation. Finally, it is quite possible that trust might change with income in a nonlinear way; but the data set for this paper is too small to test for such an effect.

While acknowledging these limitations, we set them aside for a moment, and consider the policy implications of the parameter estimates shown in Table 1. As illustrated in Figure 1, researchers are constructing theories linking inequality and sustainability outcomes based on the supposition that inequality is negatively related to social cohesion, and the results in this paper can shed light on the supposed relationship. Most importantly, this analysis support the supposition; inequality matters for social trust. The level of income also matters, but growth by itself appears insufficient. A policy of "broad-based" growth that leaves income distributions unchanged will not effectively move a low-trust society to a medium-trust society, much less to a high-trust society. Perhaps for high-income countries, but certainly for currently low-income countries, the results suggest that a combination of growth with increasing equality is more effective for improving levels of social trust than either growth or redistribution alone.

The negative relationship between inequality and social cohesion, which the analysis supports, explains only part of the link between inequality and sustainability outcomes. As shown in Figure 1, other arguments stretch from social cohesion to social and environmental outcomes (Items 6-8). Moreover, the composition effect (Item 1 in Figure 1) is nearly always

present. However, the inequality-social cohesion relationship is fundamental. It undergirds instrumental arguments about how equity and equality contribute to sustainability and so deserves close attention. Within the limits of this analysis, it holds up to scrutiny.

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