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Literature review on income inequality and the effects on social outcomes

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Executive Summary

In 2009, two epidemiologists, Wilkinson and Pickett, published a book entitled “The Spirit Level, Why More Equal Societies Almost Always Do Better” in which they claim that inequality and its acute perception by the average EU citizen is a toxic element of today’s European societies and one that seems to be associated with decreased levels of trust, civic engagement and participation, as well as to a host of other social challenges from poor health to crime, to underage pregnancies. Despite Wilkinson and Pickett’s intuitively convincing story of the link between higher income inequality and worse social outcomes, the empirical tests are based on simple bivariate correlations, implying that the authors fail to control for all the other numerous factors, which might have had an impact on both the social outcomes and income inequality. In doing so, the empirical associations reported in their book are likely to lead to misleading causal inferences. Nonetheless, Wilkinson and Pickett’s book attracted a lot of attention and called for a more careful analysis of the consequences of rising income inequality

The aim of this report is, hence, to look into sound empirical studies - based on multivariate analysis - which examine the effect of income inequality on important social outcomes related to (i) well-being, (ii) criminality, (iii) health, (iv) social capital, (v) education, (vi) political participation and (vii) female labor market participation. The upshot of this literature review is that higher criminality, reduced political agency and, to some extent, lower social capital formation and well-being appear to be tangible illustrations of the wastage produced by rising income inequality. In addition, there are a number of self-reinforcing loops linked to inequality. A clear illustration of this is the role of inequality in reducing the voting participation of the low income groups and the concomitant consequences in terms of redistributive policies and therefore on income disparities.

In more detail, the literature review has highlighted the following elements:

- 1) The effect of income inequality on happiness critically depends on the perceived mobility in a country. If income mobility is high, such as in the USA, income inequality tends to be positively associated with reported well-being as individuals tend to consider that they will eventually reach a higher income. The opposite is observed in low mobile countries (i.e. typically in European countries) because in those countries individuals feel that it is impossible to reach a higher level of income.
- 2) The majority of the studies focusing on the relationship between the income distribution and criminality conclude in favor of a detrimental effect of income inequality on criminal behaviors. The rationale behind these findings might be based on economic considerations – income inequality increases the gain derived from a criminal act –and/or on a sentiment of frustration of the less well-off individuals when they compare their situation with respect to the wealthier ones.
- 3) Empirical analyses of the harmful effect of income inequality on health are usually not conclusive, at least among wealthier European countries. This goes in line with the fact that there is still not a widely

accepted rationale for explaining why income inequality should impact on health. Furthermore, several scholars tend to suggest that the causality runs in the other way, from health status to income inequality.

- 4) In virtue to the aversion to heterogeneity theory, heterogeneous societies should be characterized by fewer contacts and in consequence, by lower levels of social capital. This prediction, also confirmed by adjacent theories, appears to be empirically validated by cross-country studies as well as by those focusing on the US context. Findings specific to EU countries are limited and less conclusive.
- 5) The relationship between income inequality and educational attainment might go in both directions. On one hand, rising inequality should encourage investments in education through increased returns to education. On the other hand, it might prevent these investments for those people belonging to the bottom of the income distribution because of resources' constraints. Regarding the latter mechanism, the empirical studies reviewed suggest a modest effect or no effect of income on educational outcomes. However, when interpreting these results caution is needed, because conclusions rely strongly on the econometric approach used by the researchers.
- 6) The relationship between turnout and inequality is likely to be mutually reinforcing because, according to the class-bias assumption, the benefits from voting are lower for the low-income group, reducing the incentive for this fringe of the population to vote. If voter turnout is skewed by income, the policies implemented with favor the well-off group (median voter hypothesis), thus participating to the intensification of income disparities. In turn, rising economic inequality will discourage participation among low-income groups, and so on. These predictions are confirmed by the majority of cross-country and single-country based studies.
- 7) There is neither a sound theoretical base nor empirical evidence of an effect of income inequality on the participation rate of women in the labor force. The causality is found to run instead from labor force participation of women to income inequality.

This report is a first step of a more comprehensive project aiming at analyzing the socio-consequences of rising income inequalities in Europe, and will be complemented with quantitative analyses of the relationship between income inequality and the social outcomes cited above.

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Glossary

Account/Control for observed country or individual characteristics: hold fixed (constant) the value of the observed country or individual characteristics.

Cross-sectional data: Data composed of multiple units such as countries, (but also regions, individuals, and households) observed at a given point in time.

Endogeneity: When we employ the term endogeneity of the economic inequality indicator we refer to the reverse causation and/or omitted variables issues addressed in the section 2 of this report.

GMM (Arellano Bond): Generalized method of moments. This estimation method allows dealing with the endogeneity of the social outcome. To be implemented, it requires panel data.

IV estimates: Instrumental variables estimates. This estimation method allows dealing with the endogeneity of the social outcome (see box 1 for the definition of instrument)

OLS estimates: Ordinary least squares.

Pooled Cross Sectional data: Data that combine cross-sectional and time series features. For instance, two cross country surveys, in two different years.

Panel data: Data composed of time series information for each cross sectional unit (such as households followed over time). The particularity of panel data, with respect to pooled cross-sectional data is the fact that the same units are followed over a given period of time.

Time series data: Data composed of a series of observations over time for a specific unit (country, region, etc.)

1. Introduction

In the past years, there has been a growing concern about the rising income inequalities with particularly stark rises in inequality in the US and also substantial widening of the income gap in Europe. The relevance of the widening of income has not only caught the political and scholarly attention but is heavily discussed nowadays on the streets, with most prominent manifestation of such protests being the ‘Occupy Wall Street’- movement. This movement and its widely-cited slogan “We are the 99%” (see for instance the reporting of the movement by the New York Times, 2011, and also the web blog “We are the 99 percent”, 2012) refers specifically to a growing unequal distribution of wealth.

The development of income inequality in the EU member states has been the subject of a recent publication by the OECD (2011). Surveying the development of income inequality over the past 3 decades reveals an interesting picture. In particular, there seems to be a general trend of widening the income gap starting in the 1980s. While in the 1980s the Gini coefficient was 0.29 it markedly rose to 0.32 in the late 2000s (ibid., p. 22). Particularly striking is the increase in income inequality of former ‘equal societies’, such as the Nordic countries and Germany. In general, there seems to be a convergence trend towards a generally higher level of income inequality.

The causes of this rising income inequality in the past decades has also attracted much political and scholarly attention. The OECD’s (2011) report provides a wealth of explanatory mechanisms, ranging from rising wage inequality to different taxation policies and household structures.

A different perspective to look at the rise in income inequality is the question what the consequences of rising income inequalities in the EU are, i.e. why should we care about the widening of the income gap? And which direct consequences should we expect from a greater divide between the 1% and the 99% of the population? These questions gained prominence through a widely cited book by Wilkinson and Pickett entitled “The Spirit Level, Why More Equal Societies Almost Always Do Better” (2009). Although their main proposition, i.e. more equal societies perform better on a wide range of social outcomes, is intuitive and straightforward, they are not able to provide convincing empirical evidence for their propositions. Nevertheless, their work initiated a more careful analysis of the consequences of income inequality.

To further the discussion on the impact of rising income inequality on various social outcomes, this report provides a literature review on the relationships between income inequality and important social outcome variables. The main social outcome variables considered in this literature review are in the area of happiness, criminality, health, social capital (trust), education, voting behavior and female labor participation.

This report is organized as follows: In section 2, we will briefly describe some technical terms and methodological issues that are meant to ease the reading of the literature review. Section 3 is dedicated to the literature review as

such. This section includes, for each social outcome variable, a description of the rationale on why income inequality is expected to affect this social outcome variable. We then discuss the most relevant empirical studies linking income inequality to the social outcome under investigation. We also include, for each individual social outcome variable, a summary table with all relevant studies considered in this report. These summary tables contain information on the data and time coverage, variables and econometric methods employed, as well as the main results of the studies discussed in the literature review.

2. Reciprocal relationships between inequality and social outcomes

Any discourse on the detrimental effect of rising economic inequality¹ should be based on sound scientific evidence. However, obtaining convincing evidence is far from being an easy task. As a precondition, relevant data on economic inequality and social outcomes have to be gathered. Then, we need to identify the *causal effect* of economic inequality, i.e. what would happen to some social outcomes (health, criminality, etc.) if inequality were to increase, everything else being kept constant.

Why bivariate analysis might be misleading:

A bivariate correlation, between two variables, Y (a social outcome, here the dependent variable) and X (economic inequality, here the independent variable) allows testing the hypothesis of an association between these two variables. However, it is important to understand that simply finding that two variables are **correlated** is not enough to conclude that a change in X **causes** a change in Y . There are various circumstances, where we could find a significant correlation between Y and X , however, we could not conclude from this that X is causing changes in Y . This will be the case in a context of:

Reciprocal relationship & reverse causation: in such a case, it might be the case, that X causes Y **or** Y causes X *or* the relationship might be reciprocal, i.e. X causes Y **and** Y causes X).

Omitted variables: this happens when Y has more than one cause (X but also other factors Z). If the effect of Z on Y is not taken into account, the estimated bivariate correlation between X and Y will unintentionally also capture the association between Z and Y .² It might be also the case that the variables X and Y are related to each other only indirectly, through another variable Z . The bivariate correlation between Y and X will spuriously conduct us to conclude that X causes Y (or Y causes X) while in fact it is not the case.

Because of these limitations, evidence-based policy should not be based on mere bivariate correlations. Therefore, the literature review presented in the current document will not report or discuss studies uniquely relying on bivariate statistics.

Multivariate analysis: the notion of *ceteris paribus*

Causal inference is based on the fundamental notion of *ceteris-paribus*, which means “other (relevant) factors being equal”, i.e. how will Y move if X changes, holding everything else constant. A multivariate analysis allows us to explore relationships between variables precisely in the *ceteris paribus* fashion. Put it differently, multivariate regressions makes it possible (i) to observe different factors that can simultaneously affect the dependent variable Y and (ii) to estimate the independent influence of each of the factors, i.e. while maintaining the value of the other factors fixed. Multivariate analyses is thus ideal to eliminate or reduce the omitted variable bias insofar as it is

¹ Note that we use economic inequality and income inequality as synonymous throughout the report.

² This is true insofar Z is simultaneously correlated with X and Y .

possible to control for all relevant variables that simultaneously affect economic inequality and the social outcome under investigation.³ The capacity to control **for all (available) relevant factors** largely depends on the quality of the database at the disposal of the researchers as well as of the estimation method employed. This is especially important when interrelated social variables are considered.

In the present literature review, we have focused our attention on papers based on **multivariate analysis and published in academic journals (or which have been recently produced)**. Furthermore, we paid particular attention to studies that “control” for a large number of factors that are known to influence the social outcome under investigation. Most of the papers reviewed do not address the issue of reverse causality which might constitute a critical problem for some of the social outcomes (for instance, education or health). Consequently, we have also made a particular effort to emphasize studies that attempt to tackle this issue of reverse causality while employing appropriate econometrics methods (see BOX 1 for an example).

³ However, if there are some important factors explaining Y that are not observable for the researchers, then it will not be possible to measure how the social outcome changes if inequality rises, while keeping these unobserved factors constant.

BOX1:

Multivariate analysis: practical example

Suppose that we want to explore the effect of income inequality at the country level on individual voting behavior in Europe. We have at our disposal a dataset which contains for each EU country some information on electoral turnout at the last national election, the country level income inequality as well as some additional information on country characteristics (such as the unemployment rate, education attainment, welfare systems characteristics etc.) for the year 2005.

A multivariate regression will take the following form:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 W_i + \varepsilon_i \quad (1)$$

where Y_i is a variable measuring the electoral turnout at the last national election for country i ($i=1, \dots, 27$) while X_i is the level of income inequality in country i and W_i are a set of other country characteristics (unemployment rate, education attainment, welfare systems characteristics etc) that are expected to impact on voting behavior. β_0 is the intercept, β_1 is the parameter associated with X_i , i.e. income inequality, β_2 the parameter associated with W_i and so on. All parameters have to be estimated.

The estimated parameter β_1 will inform about the causal effect of economic inequality on voting behavior **if and only if (i)** there are no important explanatory variables missing in the equation (1) that simultaneously affect income inequality and the social outcome and **if (ii)** there is no reverse causality issue.

To deal with the omitted variable problem, the first solution is to include **all** variables that are relevant for explaining Y_i . Unfortunately, it is not always possible as some of these variables are not observable. For instance, the country voting system might affect current voting behavior and also relate to the current level of income inequality. If this is not controlled for the estimated parameter associated with income inequality, β_1 , will be biased and hence, over- or under-estimating the impact of X_i on Y_i .

Sometime it is possible to exploit some specific features of the dataset to account for those factors that are not observable. For instance, suppose that we have the same dataset (a panel) for two years e.g. 2005 and 2009. Such a data structure allows us to control for **all time invariant factors at the country level** (in the example above, the specific country voting system but also all the other country characteristics that are time-invariant) by introducing as additional covariate “**unit fixed effects**”. In our example, this would mean to introduce “country fixed effects” (or country dummies). The intuition is the following: by including country fixed effect, the estimated parameter β_1 will provide an estimate of the average effect of income inequality **within** each country, i.e. the average effect of a change of income inequality on the change in electoral participation. Along the same line of reasoning, if we work with a panel dataset composed of individuals or regions followed over time, it is possible to respectively include individual or region-fixed effects in order to account for all individual and regional time invariant characteristics.

Several techniques exist to deal with the reverse causality issue. The instrumental variables (IV) estimator is one technique, often mentioned in the summary tables. The IV estimator is carried out by regressing the two following equations:

$$\hat{X}_i = \gamma + \rho Z_i + \varphi W_i + \omega_i \quad (2)$$

$$Y_i = \alpha + \beta_{IV} \hat{X}_i + \beta_2 W_i + \varepsilon_i \quad (3)$$

Where the equation (2) is a multivariate regression explaining the endogenous variable X_i , the income inequality measure, and Z_i is the so-called instrument, a variable which correlates with X_i but is directly unrelated with Y_i . After estimating equation (2), the predicted values of the inequality measure, \hat{X}_i , are used in place of X_i in the estimation of equation (3). Following the example above, such procedure allows to identify the direction of causality, going from inequality to voting behavior by using only part of the variability in the inequality variable, specifically the part that is directly correlated with the Y_i .

The choice of the instrument is the most crucial step in the implementation of this method, and should be carefully motivated by economic intuition or theory. Good instruments are often created by policy change, or exogenous shocks to the endogenous variable.

3. Literature review

3.1 Income inequality and happiness

3.1.1 Rationale

The discussion on whether income inequality affects an individual's happiness dates back to theoretical considerations on relative deprivation and relative utility and refers to the idea that people's utility depends not only on their own income but also on their relative position in the society (van de Stadt, Kapteyn and van de Geer, 1985). In addition, some scholars suggest that individuals can have a 'taste for equality'. In particular, Thurow (1971, p.327) proposes that "the individual is simply exercising an aesthetic taste for equality or inequality similar in nature to a taste for paintings".

An intuitive and comprehensive explanation of the impact of income inequality on individuals' well-being is provided by Hirschman and Rothschild (1973). These authors use the analogy of a traffic jam on a two-lane motorway to explain the effect of income inequality on happiness and call this the 'tunnel effect' (ibid, p.545):

"Suppose that I drive through a two-lane tunnel, both lanes going the same direction, and run into a serious traffic jam. No car is moving in either lane as far as I can see (which is not very far). I am in the left lane and feel dejected. After a while the cars in the right lane begin to move. Naturally, my spirits lift considerably, for I know that the jam has been broken and that my lane's turn to move will surely come any moment now. [...] But suppose that the expectation is disappointed and only the right lane keeps moving: in that case I [...] will at some point become quite furious."

This analogy nicely illustrates several important aspects in the relationship between income inequality and happiness. First, inequality may convey information about future prospects. This means that if I observe that the people around me are moving, then I expect to be able to move upward soon too. This suggests that income inequality might have a positive effect on individuals' wellbeing.

Second, the positive impact of inequality might turn negative if these expectations are not fulfilled, i.e. if my lane is still not moving. This has important consequences for countries in different development stages and there is empirical evidence on transition countries supporting this notion (as discussed below).

Last, the question arises at what point people do get 'upset' about their lane not moving. This refers to people's beliefs on whether mobility is possible in their country and how difficult it is for people to move upwards.

In conclusion, income inequality might affect positively the individual's level of happiness if people perceive that in their society upward mobility is possible. However, if individuals think that it is very unlikely to reach a higher income, then income inequality will probably impact negatively on happiness.

3.1.2 Measures of happiness and income inequality

The empirical studies measure happiness by relying on questions directly asking respondents on their perceived happiness or their life satisfaction. For example, the studies use the responses to the following questions:

- “Taken all together, how would you say are things these days – would you say you are very happy, pretty happy, or not too happy?” (from the United States General Social Survey)
- “On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?” (from the Euro-barometer Survey Series)
- “How satisfied are you with your life all things considered?” (from the German Socio-economics Panel Study)

There are two different ways on how income inequality is measured in the studies focusing on happiness. First, most of the studies rely on the Gini coefficient or on alternative indices such as the Theil, Atkinson or Stark index (cf. Alesina et al., 2004, and Schwarze and Harpfer, 2007). Second, studies frequently employ the ‘reference group income’, which is designed to capture the income of peers (defined by e.g. occupation, education level, sex, age and region), following the idea that people strive to ‘keep[...] up with the Joneses’ (cf. Hopkins, 2008, p.4). For studies employing the “reference group income” variable, see Luttmer (2005), Clark (2006), Grosfeld and Senik, (2008).

3.1.3 Empirical evidence

There exists quite substantial empirical evidence on the impact of income inequality on happiness or life satisfaction, mainly covering the U.S., Europe and transition countries.

The empirical evidence confirms the relationship between income inequality, happiness and social mobility. The effect of income inequality on happiness critically depends on whether individuals perceive the society to open to upward mobility and on whether it is likely that they will eventually be able to reach higher income levels. Evidence can thus be divided into the low-mobile countries (typically European), where inequality has a negative effect on satisfaction, and the highly mobile society such as US and transition countries, where there seems to be a greater variability in the outcomes of income inequality.

For European countries, Senik (2006) finds that inequality has a negative effect on life satisfaction. Alesina et al. (2004) show that this result is driven by the detrimental effect of income inequality on people with low income and to those belonging to the left ideological spectrum. On the contrary, richer individuals seem indifferent about income inequality.

For Germany, Schwarze and Harpfer (2007) find that income inequality has a negative effect on life satisfaction while Ferrer-i-Carbonell (2005) show that the higher the income of the reference group is, the lower is the level of happiness. Clark (2006) reports similar findings for Britain while using life satisfaction as the outcome.

Additionally, Clark (2006) argues that higher income inequality within the reference group actually increases life satisfaction. The latter effect might convey some form of ‘opportunity’ feeling similar to some of the findings in the U.S.

The evidence for the U.S. is somewhat mixed. Senik (2006) finds that in contrast to the evidence from Europe, inequality in the U.S. has a positive effect on life satisfaction. This result is challenged by evidence provided by McBride (2001), Luttmer (2005), and Dynan and Ravina (2007). These scholars report that a higher ‘reference group income’ negatively affects happiness. A more nuanced view is provided by Alesina et al. (2004), who investigate different income levels and incorporate the political preferences of individuals. Their finding is that in the U.S. it is the rich people, who are particularly unhappy about higher levels of income inequality, whereas the poor are indifferent to inequality. Hence, some of the contrasting evidence might be explained by different samples of individuals.

Last, several studies exist on the impact of inequality on happiness in transition countries. While Sanfey and Teksoz (2005) show that inequality has a negative impact on life satisfaction in various transition countries, Senik (2006) conclude that the income of the reference group and the level of satisfaction are positively related in transition countries. Moreover, the author provides evidence that this effect is particularly strong for younger people, i.e. below 41 years, and for individuals, who experienced higher income volatility. Similarly, for Russia, Senik (2004) finds a positive impact of ‘reference group income’ on life satisfaction and no significant effect for income inequality. The variability of the results is confirmed in Grosfeld and Senik (2008)’s study on Poland. Here, the authors find that there has been a major structural change in the perception of income inequality after 1997. Before 1997, income inequality is positively associated with life satisfaction and individual’s expectations about the future. After 1997, however, income inequality is not significantly associated anymore with life satisfaction. This is explained by the perception of Polish people that they were not benefitting from the economic transformation.

In conclusion, empirical evidence strongly suggests that the perception of income inequality as a negative force in the society depends critically on the perceived country mobility and might differ by income group, political preferences, and age. For Europe, a negative impact of income inequality or of the ‘reference group income’ on happiness is observed. Transition between political regimes may render the association inequality/happiness positive or negative in time depending on the level of expectation raised and their possible fulfillment or delusion.

Table 1: Studies on income inequality and happiness

Author	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Alesina, Di Tella, & MacCulloch, 2004	US, individuals Period: 1981-1996 12 European countries, individuals, 1975-1992	INE: Gini O: Happiness or life satisfaction	Ordered probit, state and year dummies, robust standard errors	Overall inequality found to decrease happiness. However, strong differences between US and Europe: in the US, the rich are unhappy about inequality and poor are indifferent while in Europe the poor and leftist individuals care about inequality and rich are indifferent.
Dynan & Ravina, 2007	US, individuals, 1979-2004	INE: relative income measure: own group income – other people’s income O: Happiness	Pooled OLS	Happiness is higher if income of own group is higher than the income of other people
Schwarze & Harpfer, 2007	West Germany, individuals 1985-1998	INE: Gini, Theil and Atkinson, - income quintile O: Life satisfaction	Ordered probit, region and time fixed effects and individual random effects, robust standard errors (and also pooled OLS and panel fixed effects)	Inequality: negative effect on life satisfaction, but only when measured with Gini or Theil, not for Atkinson Relative income position (income quintile): no impact on life satisfaction
Clark A. E., 2006	Britain, individuals, 1991-2002	INE: Gini based on reference group income O: Life satisfaction and the GHQ-12	Ordered probit, clustered standard errors (but also panel random effects, fixed effects logit and random effects probit)	Reference group income has a negative impact on life satisfaction. Life satisfaction is positively related to reference group income inequality.
Grosfeld & Senik, 2008	Poland, individuals, 1992-2005	INE: Gini, reference group income O: Life satisfaction and private expectations of the future	Ordered logit, year and region dummies, clustered standard errors (and sup-Wald test)	Both satisfaction and expectations of the future are positively influenced by inequality up to 1997. Afterwards, inequality has no effect on expectations and has a negative effect on satisfaction. Similar results when the income of the reference group is used.
Sanfey & Teksoz, 2005	19 European countries 1981-84,1990-93, 1995-97, 1999-2002	INE: Gini O: Life satisfaction	Ordered probit, country dummies	High inequality is associated with lower life satisfaction for transition countries and with higher life satisfaction for non-transition countries.
Senik, 2006	European countries, transition countries, US, individuals	INE: reference income and surplus of individual income beyond reference income O: Life satisfaction	Conditional fixed effects logit, time dummies (also ordered probit model)	Inequality is negative for ‘old’ European countries and positive in post-transition economies and the US
Luttmer, 2005	US, individuals, 1987-88, 1992-94	INE: Reference income in the neighborhood O: Happiness	Pooled OLS, state, survey wave, and individual fixed effects (also ordered probit)	Higher reference earnings are associated with lower levels of happiness
Senik, 2004	Russia, individuals, 1994-2000	INE: Reference group income, Gini O: Life satisfaction	Ordered probit with Mundlak transformation of exogenous variables or individual fixed effects, and year and region fixed effects	Reference group’s income has a positive effect on satisfaction. Inequality indices do not affect individual satisfaction.
McBride, 2001	US, individuals 1994, and 1972, 1977, 1982, 1986, 1992 and 1996	INE: reference group income O: Happiness	Ordered probit	Reference group income has a negative effect on happiness.
Ferrer-i-Carbonell, 2005	Germany, individuals, 1992-1997	INE: reference group income, distance between the individual’s own and the reference group income O: Life satisfaction	Ordered probit, fixed time effects and individual random effects incorporating Mundlak transformation	Reference group income has a negative impact on happiness. Individuals are happier the larger their income is in comparison to the reference group.

3.2 Income inequality and criminality

3.2.1 Rationale

The determinants of criminality, and in particular the role played by income inequality, has attracted the attention of scientists from various disciplines.

Economic theories for criminal activities date back to Becker (1968) and stress that a criminal act is the result of a rational decision based on a cost-benefit analysis. Individuals decide to participate or not in criminal activities by comparing the returns of criminal and legal activities. The net return of a criminal act is the difference between the loot and the associated costs such as the opportunity cost and the severity of punishment if the individual is caught while committing the crime. Income inequality should increase the potential gain derived from a criminal act for individuals situated at the bottom end of the income distribution because the gap between their income and the country mean income is larger, relatively to a situation in which the resources would be more evenly distributed.

Sociological theories sustain that criminal activities result from a feeling of frustration of the less well-off people when they compare their situation with respect to the one of wealthier individuals. The higher is income inequality, the greater is the sentiment of unfairness of disadvantaged individuals. Economic deprivation and the associated feeling of resentment might spur criminal behaviors (Morgan, 2000, citing, in particular, Merton's work, 1938).

3.2.2 Measures of criminality and income inequality

Typically, crime statistics used in empirical studies refers to homicide, robbery and property crime rates. However, most of these official data sources suffer from under-reporting, with some categories of crime more particularly afflicted by errors than others (MacDonald, 2002). Homicide and robbery rates tend to be more reliable figures since the violence associated with such criminal acts tend to increase the proclivity for the victim to officially declare the crime to the police. Cross-country comparisons are also often problematic because of legal differences across countries in the way crimes are defined. In addition, the quality of the data strongly depends on the country-specific police and justice systems (Fajnzylber et al, 2002a).

The Gini coefficient is the measure of economic inequality employed in all empirical papers reviewed below. However, some studies use additional inequality indices (ratio of income of the richest to the poorest quintile, proportion of the population with an income below a certain value) to check the robustness of the findings (see Nilsson, 2004, Brush, 2007, Fajnzylber et al, 2002a).

3.2.3 Empirical evidence

Empirical studies

Testing the causal effect of inequality on crime rates is not straightforward because several socioeconomic factors are likely to be simultaneously correlated with income inequality and criminal rates. If these factors are not controlled for in the multivariate setting, we cannot conclude that the estimated association between economic inequality and criminality is causal. The fact that crime rates are measured with errors also complicates the work of researchers in particular if these measurement errors are not random but are, instead, correlated with other variables related themselves to income inequality. Dealing with the problems cited above, i.e. with the “endogeneity” of the inequality index, is critical to be able to say something about the causal effect of income inequality on crime rates.

Empirical papers examining the effect of income inequality on crime rates are based on (i) cross-country data or (ii) single country data. Country-specific studies can be of two types: the first one only relies on cross-sectional information (i.e. cross-region) whilst the second type of study combines cross-sectional data with time series information (i.e. cross-region observed over two or more periods of time).

Cross-country studies

Using data from the United Nations World Crime Surveys, Fajnzylber et al. (2002a) examine the determinants of national criminal rates across a sample of around 40 countries and on a 40 years period. The authors show that income inequality, as measured by the Gini coefficient, exerts a positive and significant effect on homicide and robbery rates, and these results are robust to the inclusion of a large set of control variables and to alternative econometric methods. In a companion paper, Fajnzylber et al. (2002b) find that the effect of income inequality on violent crime is robust to alternative measures of income inequality such as the ratio of income of the richest to the poorest quintile of the population, which is an index of income polarization.

Single-country studies

Country-specific studies have mainly been based on US data. Back in 1973, Ehrlich, in his analysis of state crime determinants, finds a positive association between property crime and inequality as measured by the percentage of the population with an income below one half of the median income. Recent studies on US data show contrasting results. Kelly (2000), using data from the 1991 FBI uniform crime reports on urban counties, concludes that inequality has a substantial positive effect on property crime but does not relate to violent crime. The conclusions of both studies must be treated with care because the empirical analyses are based on cross-sectional data, which prevents the authors to control for time-invariant local effect. If the time-invariant local effects are correlated with both criminality rates and income inequality, the estimated effect of income inequality might be spurious. The two studies cited below deal with this methodological issue (Brush, 2007 and Choe, 2008).

Brush (2007) using data at the county level over the period 1994-2000, observes that with ordinary least squares (OLS) estimates, income inequality displays a negative coefficient while first-differenced estimates (i.e. the variables in the model are not expressed in level but in changes from one period to the next) show an opposite or non-significant effect. On the other hand, Choe (2008), using criminal information at the state level, over a longer period (1995-2004) concludes that once area time invariant specific effects and the “endogeneity” of inequality are taking into account, income inequality increases burglary and robbery rates.

Studies on EU countries are far more limited. Nilsson (2004), with Swedish counties data for the period 1973-2000 finds that property crime is positively related to relative poverty, as measured by the proportion of the population with an income below a certain percentage (10, 20 or 30%) of the mean income. However Nilsson (2004) does not observe any effect of relative poverty on crime. These results hold with county and time fixed effects. The author notes that the empirical findings vary with the inequality measures and that while relative poverty matters for property crime, it is not the case with inequality measures that consider the entire income distribution (such as the Gini coefficient).

Machin and Meghir (2004) examine the role of wage variations at the bottom of the wage distribution on property and vehicle crimes in the UK between the mid-1970s and mid-1990s. Including area-specific effects as well as time effects, the authors conclude that the lower is the 25th percentile wage, the higher is the probability to observe criminal activities.

In conclusion, the majority of the papers reviewed suggest that income inequality increases criminal behaviors. More precisely, cross-country studies and country specific studies of the first type conclude that income inequality is positively associated with criminal behaviors while, country specific studies of the second type tend to produce more mixed results.

Table 2: Studies on income inequality and criminality

Topic	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Fajnzylber et al, 2002a	Panel data: cross country & time series 40 countries 1970-1994	INE: Gini O: Homicide and robbery rates	Dynamic specification System GMM estimator in order to deal with the endogeneity of inequality	Inequality increases homicide rates and robbery rates
Fajnzylber et al, 2002b	Panel data: cross country & time series 40 countries 1970-1994	INE: Gini, ratio of income of the richest to the poorest quintile, index of income polarization O: Homicide and robbery rates	Dynamic specification System GMM estimator in order to deal with the endogeneity of inequality	Crime rates and inequality are positively correlated
Nilsson 2004	Sweden, counties, 1973-2000	INE: proportion of the population with an income below 10%, 20% or 40% of the median income (PR), Gini, 90th/10th percentile O: overall crime rate and 3 property crime-categories: burglary, auto theft and robbery.	County fixed effects, county specific time trends	PR exerts a positive influence on property crime but not on assault The other inequality measures are not related to criminal behaviors
Brush, 2007	USA, counties 2 periods: 1990 and 2000	INE: Gini, percent in poverty & percent with an income over \$ 100,000 O: Overall crime, violent and property crimes	Cross-sectional estimates based on 2000 data First-differences estimates: estimates based on within county variations	Cross sectional estimates: positive relationship between inequality and reported crime rates, both for violent and property crimes. First difference estimates: inequality is negatively or not significantly associated with criminality.
Choe, 2008	USA, states and Columbia district, 1995-2004	INE: Gini, O: Overall violent crime, murder, rape, robbery, assault, overall property crime, burglary, larceny, motor	State fixed or random effects estimates (decided on the base of the Hausman test) Arellano Bond estimates : dynamic specification and endogeneity of covariates taken into account	State fixed or random estimates: overall violent and property crimes positively influenced by inequality. Among violent crime, only rape is associated with inequality. For the property crime, burglary is related significantly to inequality Arellano Bond (GMM) estimates : inequality positively and significantly related to robbery and burglary
Kelly, 2000	USA, urban counties, 1991	INE: Gini O: Violent and property crimes	Cross-sectional estimates including a set of urban specific variables	Inequality is not related to property crime but increases violent crime
Machin and Meghir 2004	UK, 1975-1996, area level	O: property and vehicle crimes INE: 25 th or 10 th percentile of the real hourly wage distribution	Area-fixed effects and additional covariates	The lower is the 25th percentile wage, the higher is the probability to observe criminal activities

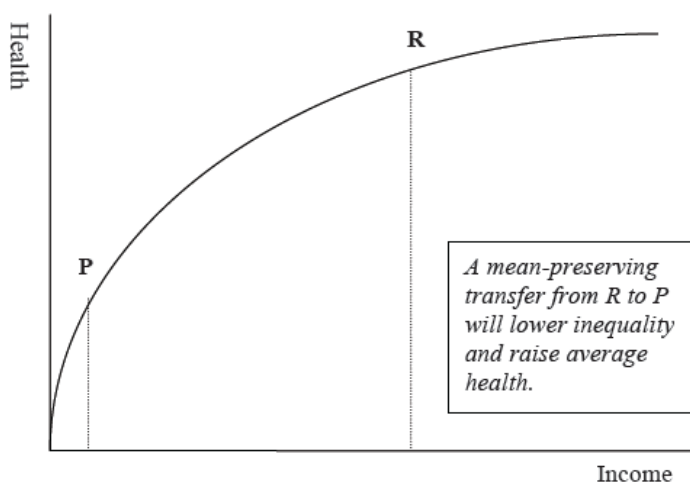
3.3 Income inequality and health

3.3.1 Rationale

In the past 20 years more than hundred published articles have been trying to disentangle the relationship between income inequality and health (cf. Lynch et al., 2004). This amount of research already indicates that it is far from easy to clearly link income inequality to health outcomes. Part of the problem is the lack of a widely accepted rationale on why wider income distribution should affect an individual's health status. A part of the empirical evidence even suggests that the causality runs in the other way, i.e. from health to inequality. In the following paragraphs, the three most widely mechanisms to connect income inequality and health are discussed (see Leigh et al., 2009, Deaton, 2003, and Gravelle, 1998).

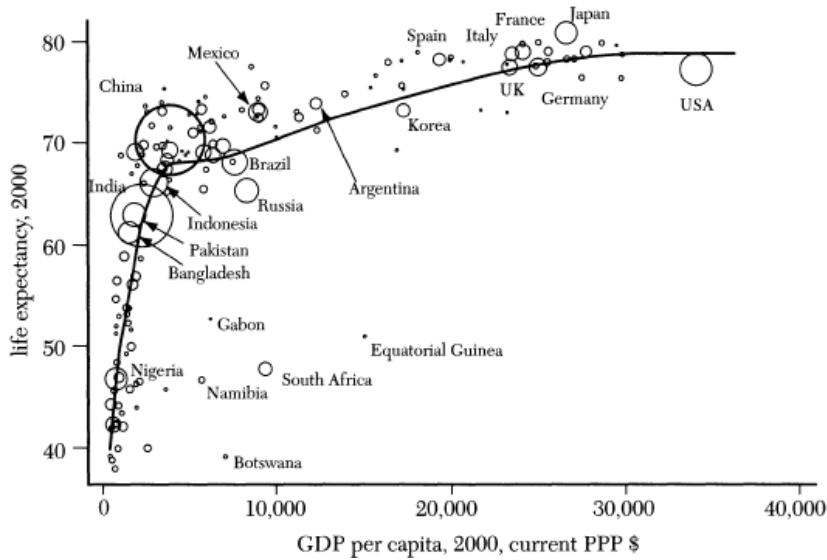
The absolute income hypothesis postulates that an individual's health status increases with individual income but at a decreasing rate (see Figure 1). This means that one extra Euro given to a deprived person increases his/her health status more than the same Euro spent on a rich person. Hence, there exists a non-linear relationship between income and health status. Figure 2 illustrates this argument by displaying at the country level the bivariate relationship between life expectancy and GDP per capita. This non-linear relationship was found between countries when comparing richer and poorer countries but also within countries (Leigh et al., 2009, p.6-7). As Deaton (2003) argues, this supports the idea that within a country a redistribution of income from richer to poorer individuals will increase the overall health status. In other words, under the absolute income hypothesis an effect of income inequality on health would be caused by the non-linear relationship of income and health.

Figure 1: Non-linear relationship of income and health



Source: Leigh et al., 2009, p. 6

Figure 2: Cross- country evidence of life expectancy and income



Source: Deaton, 2003, p. 116

The second mechanism proposed in the literature is the *relative income hypothesis*. The relative income hypothesis postulates that an individual's relative income position within a country affects the individual's health status. The rationale for this hypothesis is not clearly spelled out in the literature. Most scholars, however, propose the following mechanism: lower relative income increases chronic stress of individuals, due to an increased feeling of deprivation. This chronic stress is then seen to translate into an unhealthier life (Leigh et al., 2009, p.8).

The last mechanism to explain why income inequality might affect health is the idea of *societal effects* and, in particular, the effect of increased violence due to higher income inequality. Higher violence and crime rates might lead to higher death rates (i.e. homicides) but also to increased levels of stress, which then translate into worse health outcomes. The effect of income inequality on crime was already discussed more extensively in section 3.2. Other societal effects mentioned in the literature are related to societal heterogeneity. In particular, greater heterogeneity is seen to hinder societies to agree on investments in public goods (cf. Alesina et al., 1999). This implies, that higher income inequality might lead to lower investments in the health sector, e.g. in hospitals, and this then might translate into lower health status of the surrounding population (cf. Leigh et al., 2009, p. 9-11). Moreover, higher income inequality in countries is also related to lower levels of trust (for a discussion, see section 3.4).

Note, as we already mentioned above, researchers not only propose a causal relationship between income inequality and health, but also support the reciprocal relationship, i.e. the effect of increased health status on income. In particular, scholars propose that health can affect income via labor market effects, educational effects and marriage market effects (Leigh et al., 2009, p.11-13). Leigh et al. (2009) argue that unhealthier individuals have more difficulties in finding and retaining a job and in obtaining a promotion, thereby having lower levels of income (some evidence on this link can be found in Gertler and Gruber, 2002). Second, improved health of students is positively related to educational attainment and to lower dropout rates of students, causing an increased income

later in life. Last, Leigh et al. (2009) argue that healthier people are more likely to marry and build stable relationships, which additionally affects income levels.

In the “empirical evidence” section, we will discuss studies focusing on the impact of the impact of income inequality on health and will abstain from discussing evidence on the reverse causality.

3.3.2 Measures of health and income inequality

There are two main indicators used to measure health status in the literature. The first relates to an objective measurement of health status and uses indicators such as mortality rates and life expectancy. Mortality rates measure the death rates in a given year. Life expectancy at birth measures the weighted probability that individuals of different ages died in that year. Depending on the sample of countries and type of studies, also other indicators are used to investigate the relationship between income inequality and health, including indicators on disabilities, death rates according to specific causes (e.g. heart attack), and depressions (for an excellent overview over the literature see Lynch, et al., 2004 and Subramanian and Kawachi, 2004).

The second group of indicators used in the literature measures subjective health status using survey data. In various surveys, there are questions included on self-rated health status (for example in the European Community Household Panel (ECHP)). Examples of such questions are “Would you say in general your health is: excellent, very good, good, fair, or poor?”.

The main indicator used in the empirical studies is the Gini coefficient, however also other measures of income inequality, such as the 90/10 ration, 50/10 ratio, Robin Hood index, Atkinson index, Theil index, median income (income of the poorest 50%) are used (cf. Lynch, et al., 2004).

3.3.3 Empirical evidence

The literature on health and income inequality dates back to the 1970s. More recently, in a series of articles, Wilkinson (1992, 1994, 1996) concludes in favor of a negative impact of income inequality on health. However, this view was challenged in particular by scholars who pointed to strong inconsistencies in the use of data (Judge, 1995).⁴ More recent empirical studies provide a mixed picture on the effect of income inequality on health and results seem to be sensitive to the (i) underlying regional focus of the study, (ii) estimation methods employed and (iii) unit of observation (individuals, state, or country analysis).

Concluding from the wealth of studies reviewed by Lynch et al. (2004), income inequality does not seem to have a negative effect on health status at least among wealthier nations, including among them countries such as Belgium, Denmark, and Spain (ibid, p.54). In particular, Lynch et al. (2004) argue that there is a positive effect of income

⁴ In particular, Judge (1995, p.1283) points out that the econometric results produced by Wilkinson might be explained by the use of an incorrect poverty estimate and the use of different years when matching income and life expectancy.

inequality on mortality rates in Belgium (Lorant et al., 2001), inequality was not related to mortality or heart disease in Denmark (Osler et al., 2003), and no effect of inequality on disabilities or life expectancy is found for Spain (Regidor et al., 1997). For Sweden, Gerdtham and Johannesson (2004) did not find a significant effect of income inequality on mortality. The evidence for the UK is more mixed. Stanistreet et al. (1999) find some significant effects of income inequality on health. However, a strong link between inequality and health in the UK is challenged by the evidence provided by Weich et al. (2001 and 2002).

Additional evidence is provided by Hildebrand and Van Kerm's (2009) for 11 European countries. In particular, the authors test the relationship by employing data on the NUTS0 and NUTS1 level in Austria, Belgium, Denmark, Finland, France, Greece, Italy, Ireland, Portugal, Spain and the UK. Although the authors find a statistically significant effect of income inequality on self-rated health status in EU countries, the magnitude of this effect is negligible. In contrast, the empirical results for the U.S. point to a consistent and negative effect of income inequality on health status (see Lynch et al., 2004).

In conclusion, the empirical evidence suggests that income inequality does not have a negative effect on health status at least among wealthier nations in Europe. For the US, on the other hand, there seems to be consistent evidence for a negative impact of income inequality on health outcomes.

Table 3: Studies on income inequality and health

Topic	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Lorant et al. (2001)	Belgium, municipalities, 1985-93	INE: Gini O: Mortality and morbidity variables	Weighted least squares model and simultaneous autoregressive model	Higher income inequality is associated with lower mortality rates
Osler et al. (2003)	Denmark, individuals, 1964, 1992	INE: Median share of income in municipality O: Ischaemic heart disease	Cox's proportional hazard regression models	No clear association between income inequality and Ischaemic heart disease
Regidor et al. (1997)	Spain, regions, 1986	INE: Difference in the mean household income between those at the bottom and those at the top of the income hierarchy O: Prevalence of long term disabilities	Logistic regressions	Income inequality does not affect disabilities
Gerdtham and Johannesson (2004)	Sweden, individuals, 1980-86	INE: Gini, Robin Hood index, median income, variance of income O: Survival time in years (mortality)	Cox's proportional hazard regression models	Income inequality does not affect mortality rates
Stanistreet et al (1999)	UK, individuals, 1991	INE: squared coefficient of variation O: Mortality	OLS	Income inequality does affect mortality
Weich et al. (2001)	UK, individuals, 1991	INE: Gini O: Prevalence of mental disorder	Logistic regression, with clustered standard errors	Mental disorders were more common in areas with greater income inequality
Weich et al. (2002)	UK, individuals, 1991	INE: Gini O: Self-rated health	Logistic regressions, with clustered standard errors	Income inequality is weakly related to worse self-rated health
Hildebrand and Van Kerm (2009)	Austria, Belgium, Denmark, Finland, France, Greece, Italy, Ireland, Portugal, Spain and the UK, NUTS0 and NUTS1 level, 1994-2001	INE: Gini, Theil index, mean log deviation, coefficient of variation, ratio of 90/10 O: Self-reported health status	Panel fixed effects estimation	Income inequality is negatively related to self-rated health status but the magnitude of the impact of inequality on health is low
Leigh and Jencks (2007)	Australia, Canada, France, Germany, Ireland; Netherlands, New Zealand, Spain, Sweden, Switzerland, UK, US, 1903 - 2003	INE: Income of richest 10% O: Life expectancy at birth and infant mortality	Country and year fixed effects estimation, robust s.e., clustered at country level	No relationship between mortality and inequality

3.4 Income inequality and social capital

3.4.1 Rationale

The term social capital is often traced back to the work of the sociologist Bourdieu (1977), but it gained popularity with the seminal work of Coleman (1990) and Putnam (1993). Recently, Guiso et al. (2008) define social capital as “good” culture—i.e., a set of beliefs and values that facilitate cooperation among the members. The authors show that social capital can be measured by both direct indicators (such as generalized trust) and indirect indicators (such as blood donations).

There is a large consensus that heterogeneity is one important factor reducing the formation of social capital. Usually, community heterogeneity refers to income inequality but also ethnicity, and racial heterogeneity. In the present literature review, we concentrate our attention on economic inequality. Several mechanisms could explain the association between economic inequality and social capital.

First, individuals might be adverse to heterogeneity. In other words, they prefer having contacts with individuals that are similar to themselves, i.e. that belong to the same socioeconomic group. In heterogeneous societies contacts between dissimilar individuals will be at a lower rate than in more homogeneous societies. Repeated interactions being conducive of social capital and trust, heterogeneous societies are thus characterized by fewer contacts and, in consequence, by lower levels of cooperation and trust (see the seminal work by Colman, 1990, and Alesina et al, 2002 for instance).⁵

This aversion to heterogeneity can be driven by the fact that individuals from different socioeconomic groups are less likely to share common values and norms which makes it more difficult for them to predict the attitudes of others. This creates an environment not favorable to the development of social capital (Knack and Keefer, 1997).

Second, when resources are not evenly distributed, poor individuals might perceive that they are living in an unfair society where the rich tend to exploit the poor. This will lead individuals at the bottom end of the income distribution to develop distrust against richer individuals (Rothstein and Uslaner, 2004). Uslaner and Brown (2005) argue that when income inequality is high, individuals from different socioeconomic groups will have the sensation that they are not sharing the same fate, and this will hamper trust.

Third, inequality should relate to the level of optimism. Higher level of inequality is likely to reduce the level of optimism for the future and thereby trust (Uslaner and Brown, 2005, Rothstein and Uslaner, 2005).

⁵ It is also possible that in more heterogeneous societies, contacts with dissimilar individuals are more frequent than in homogeneous societies, and because, on average people distrust those that are dissimilar from themselves, then, the level of trust tends to be lower in more heterogeneous societies.

Finally, economic inequality increases the incentives for dishonest comportments directed against the rich, by the poor people. This implies that poor people will be less trustworthy, which will, thereby, reduce the level of social capital of richer individuals.

3.4.2 Measures of social capital and income inequality

Most of the scholars interested in the relationship between social capital and income inequality have relied on trust as a proxy for social capital. The type of question used to assess the level of trust is “In general, do you think that most people can be trusted?”. Fewer studies focus on different dimensions of social capital such as group membership, volunteering (Alesina and LaFerrara, 2000, Costas and Kahn, 2003, and Uslaner and Brown, 2005), informal social capital such as entertaining with friends and relatives (Lancee and Van de Werfhorst, 2011).

The Gini coefficient is by far the most common measure of economic inequality used in the empirical papers though other indicators, such as the ratio of the 90th over the 50th or 10th percentile income, interquartile income differences (Gustavsson and Jordhal, 2008, Coffe and Geys, 2006) or the mean distance to the median income (Lancee and Van de Werfhorst, 2011) have been employed as well.

3.4.3 Empirical evidence

Empirical studies on the relationship between heterogeneity and the level of social capital are of three types. Cross-country papers explore either the association at the aggregated level between income inequality and social capital or combine individual-level data on social capital with country-level information on economic inequality. Studies on single countries pool information on income inequality at the subnational level with individual level information on social capital.

Cross-country studies

Most of the cross-country studies conclude that when income inequality is high, the level of social capital tends to be lower (Knack and Keefer, 1997, Uslaner, 2002, Leigh, 2006a, Fisher and Torgler, 2006, Berggren and Jordhal, 2007, Bjornskov, 2006).

Based on aggregated country-level data drawn from the World Values Surveys, cross-country estimates reported in Knack and Keefer (1997) show that the country level of income inequality is negatively and significantly related to trust and civic cooperation. The empirical analysis is based on 29 market countries, and several country-level controls are included in the estimates.

Contrary to the studies mentioned above, Leigh (2006a) explores the relationship between social capital and income inequality but combines individual data drawn from the World Values Surveys in 59 countries with country measure of income dispersion. The author finds that both income inequality and ethnic heterogeneity are negatively

associated with trust but that the effect of income inequality dominates the one of ethnic heterogeneity. The results hold even after taking into account the reciprocal relationship between income inequality and social capital. Using also the World Value Surveys, cross-country estimates in Berggren and Jordhal (2006) confirm these findings. Fisher and Torgler (2006) also with individual data on trust for 25 countries observe that trust is positively associated with a person's relative income position as measured by the difference between a respondent's income and the national (or regional) income.

While all the papers mentioned above find a strong negative association between social capital and economic inequality, Steijn and Lancee (2011), on contrary, conclude that income inequality and perceived inequality do not correlate with trust once country wealth is controlled for. Additionally, Lancee and Van de Werfhorst (2011) examine the effect of income inequality in EU countries on various forms of social capital capturing social, civic and cultural participation. The empirical work is based on the 2006 EU-SILC survey and demonstrates, that while, on the one hand, civic participation is significantly associated with economic inequality, on the other hand, this does not seem to be the case for social and cultural participation.

Although these studies are all informative, they are problematic when it comes to making causal statements. Indeed, cross-country analyses are plagued by the risk of omitting relevant variables, and comparability issues between countries (particularly to measure income inequality) which would bias the results and would lead to misleading conclusions. In particular, this body of literature is mainly based on static data (one point per country) meaning that it is not possible to control for all potential time-invariant country specific-effects (and thus to look at the effect, *within a country*, of income inequality change on social capital formation).

Single-country studies

Research based on a single country generally relies on a multilevel approach. Social capital is measured at the individual level and explained by both individual socioeconomic characteristics (age, educational attainment, income, gender, etc) and the social context in which the respondents are living (in particular, the level of community heterogeneity). This social context is defined at the municipal/neighborhood level (Alesina and La Ferrara, 2000, 2002, Leigh, 2006a, Costas and Kahn, 2003, Coffe and Geys, 2006, Gustavsson and Jordhal, 2008). The fact of relating individual-level data on trust with income inequality measures from local communities presents the main advantage of keeping constant country-specific determinants of trust which are susceptible to bias cross-country estimates if they are not controlled for. Furthermore, while income inequality measures used for cross-comparisons are subject to measurement comparability issues, this is less the case when one relies on income inequality measures of different geographical units within a given country.

A significant literature has documented the negative effect of community heterogeneity on social capital across metropolitan areas in the US. Alesina and La Ferrara (2000 and 2002) use cross-sectional data from the US General Social Surveys over the period 1974-1994 to examine the effect of community heterogeneity on membership and trust. After having controlled for individual and some community characteristic as well as for year and state-fixed

effects, the authors find that respondents living in more racially fragmented and income unequal communities report lower levels of social capital. However, the effect of racial heterogeneity is even stronger and income inequality has no longer a significant effect on trust when this variable is added to the empirical model. Costas and Kahn (2003) also observe a negative impact of community heterogeneity on various measures of social capital (volunteering and membership in organizations), once they control for individual characteristics as well as for time and regional dummies. However, in contrast to Alesina and La Ferrara (2000 and 2002) their results suggest that the crucial determinant of volunteering and membership in organizations is income inequality.^{6,7} Tesei (2011), using the decomposability of the Theil index, shows that what really matters is income inequality between racial groups. While racial fragmentation and economic inequality are both significantly associated with trust and group participation, these effects become insignificant when income inequality between racial groups is accounted for.

Solid empirical evidence on the relationship between social capital and income inequality outside the US are quite limited. Leigh (2006b) analyzes the determinants of localized trust (trusting those living in the same neighborhoods) and generalized trust (trusting those who live in the same country) in Australia using individual data over the period 1997-1998 combined with information on the neighborhood in which the respondents are living. Results suggest that there is not an apparent relationship between inequality and trust and this result remain identical when the author accounts for the possible “endogeneity” of income inequality.

Coffe and Geys (2006) explore the effect of income inequality on the municipality level of social capital in 307 Flemish municipalities in 2000. The authors rely on 3 indicators measuring social capital in a broad sense: associational life, electoral participation and crime rate that are combined into a single index using a principal component analysis. After having controlled for several socioeconomic characteristics of the municipality, the authors do not observe any effect of income inequality on social capital. On contrary, ethnic heterogeneity has a depressing effect on social capital.

Gustavsson and Jordhal (2008) combine Swedish individual-level panel data (1994-1998) on trust with county level measures of inequality. The results suggest that different measures of income inequality lead to different conclusions. The Gini coefficient is weakly related to trust while the ratio of the 50th over the 10th percentile income displays a negative and significant association with trust suggesting that differences in the bottom half in the income distribution are those that matter the most for explaining trust. Compared to Alesina and La Ferrara (2000, 2002), Leigh (2006b) or Costas and Kahn (2003), the panel data employed in this study allows for controlling for time-invariant individual and county characteristics in addition to the conventional time-varying individual covariates. This implies that the estimated association between social capital and income inequality is very likely to be a causal one.

⁶ Costas and Kahn (2003) also find that the increase in the participation of women on the labour market is the main responsible for the decline in social capital produced inside home (entertaining friends and relatives).

⁷ Note that when the authors correct for the endogeneity of income inequality in the volunteering equation, the coefficients associated with income inequality becomes insignificant.

In conclusion, macro studies usually conclude that income inequality depresses social capital while micro studies produce more contrasted results. In the USA, there seems to be a robust negative association between community heterogeneity and social capital. Findings for other countries are less conclusive.

Table 4: Studies on income inequality and social capital

Topic	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Alesina and La Ferrara (2002)	USA 1974-1994	INE : Gini measured at the local level (metropolitan areas) O: Trust	Control for individual and communities character plus state and year dummies DFbeta method to control for outliers	Respondents living in more fragmented and income unequal communities report lower level of trust Effect of income inequality no longer significant when racial heterogeneity is controlled for
Alesina and La Ferrara, (2000)	USA 1974-1994	INE: Gini measured at the local level (metropolitan areas) O: Membership rate	Inclusion of individual and community covariates plus state and time dummies DFbetas method IV estimates	People living in more unequal communities are less likely to join groups, even after controlling for racial fragmentation
Knack and Keefer (1997)	Cross-country 1981and 1990/1991 29 market economies	INE :Gini coefficient O: Trust and civic cooperation	Cross country estimates (one point in time), including country covariates	Trust and civic norms are stronger in nations with higher and more equal incomes
Gustavsson and Jordahl (2008)	Sweden, 1994-1998	INE : Gini, 90/10, 90/50, 50/10 ratios O: Trust Individual data in panel combined with county specific information	Controls include county and individual fixed effects, time dummies and time-varying individual covariates OLS and IV estimates	Gini coefficient weakly related to trust while the ratio p50-10 is negatively and significantly related to trust. Differences in the bottom half in the income distribution matter for trust. The effect of income inequality is primarily observed for people with a strong aversion against income inequality
Leigh, (2006 a)	Cross-country: 59 countries (1999/2000 and 1995/1997)	INE :Gini O: Trust	OLS Estimates at the (i) country level and (ii) individual level IV estimates with inequality instrumented by the relative size of a country's mature age cohort	Country income inequality is negatively and significantly associated with country level of trust
Leigh, (2006 b)	Australia, 1997-1998	INE: Gini O: "generalized" and "localized" trust	Probit and IV estimates on individual data with income inequality measured at the neighbourhood-level and individual controls	Income inequality at the neighborhood level is not significantly associated with individual trust. It is racial fragmentation that matters.
Coffe and Geys, 2006	Belgium, 2000	INE: Ratio of the interquartile difference in income (Q3-Q1) to the median income level O: (i) Electoral turnout in 2000 at municipal elections, (ii) density of associational activity, (iii) crime rate per capita. The 3 SC indicators are combined together.	Cross -sectional (307 municipalities) OSL and interval estimates Several control for the socioeconomic characteristics of the municipality Explanatory variables lagged one year	Income inequality is not significantly correlated with the municipality's level of social capital.
Costa and Kahn (2003)	USA, period coverage varying (between 1972 and 1998)	INE: Gini (measured at the municipal level) O: Social capital produced outside home: trust, volunteering, membership, social capital produced inside	Probit estimates Controls include individual character, survey and regional dummies, in addition to the variables measuring community heterogeneity.	Rising community heterogeneity, and in particular income inequality, is negatively and significantly related to social capital

home: entertaining, meeting friends

IV estimates also presented for the determinants of volunteering

Berggren and Jordhal (2006)	Cross-country 24 countries 1995 or 2000	INE: Gini O: Trust	Cross -country estimates Include country-level covariates	Rising income inequality is associated with lower trust
Fischer and Torgler (2006)	Cross-country 25 countries 1998	INE: Relative income position O: Generalized trust and trust in institutions	Cross country estimates based on individual data Probit estimates Estimates include individual controls	Trust rises with the respondent's relative income position
Steijn and Lancee (2011)	Cross-country 20 Western countries, 1999 21 European countries, 2002	INE: Conventional gini coefficient and Gini coefficient of perceived inequality O: Trust	Cross-country estimates, at one point in time Individual controls Multilevel logistic and linear models	Once we control for general wealth, the effects of actual inequality and perceived inequality are not significantly different from the zero
Uslaner and Brown (2005)	USA	INE: Gini O: Trust, civic and political participation	Cross-sectional estimates; state controls, time fixed effect	States with higher levels of economic inequality have fewer trusters. None of the measures of political participation are significantly related to trust.
Tesei (2011)	USA, 1972-2008	INE: Gini index, Theil index O :Trust, group membership	Individual data combined with community measures of community heterogeneity	Both racial fragmentation and income inequality are negatively correlated with trust. Racial fragmentation has the strongest effect. The opposite is found for group membership: income inequality has the strongest effect When income inequality between racial groups is accounted for, income inequality and racial fragmentation become insignificant.
Bjornskov (2006)	Cross-country, 88 countries	INE: Gini O: Trust	Static cross-country estimates	The strongest determinant of trust is fractionalization and in particular income inequality

3.5 Income inequality and education

3.5.1 Rationale

The high and positive correlation between education and income is a well-established fact. In the theory of the human capital, Gary Becker (1964) showed that acquiring education increases the skills and competencies of individuals and their productivity. Since in a competitive labor market wages equal workers' productivity, higher productivity leads to higher wage. This means that a more educated society holds greater welfare. Since its conceptualization, this theory was the focus of increasing scientific research. Supporting as well as opposing views have encouraged the production of countless empirical and theoretical studies. Nowadays, the acknowledgment of a causal relationship between education and earning is a well-established result and it is one of the most important achievements in economics.

Conversely things are less clear-cut when analyzing the link between income inequality and educational attainments.

On the one hand, rising wage inequality should encourage investments in education mainly because it raises the return to education. Topel (1997) observes a faster skill accumulation as a result of rising returns. This increase in the supply of skills should eventually mitigate the increase in inequality.

On the other hand, increasing income inequality affects also the resources that households have available to finance education. The intergenerational theory claims that there exists a perfect correlation between income and education distributions. This entails that barriers, e.g. liquidity constraints, family background, might prevent the investment in education for the fraction of the population belonging to the bottom of the income distribution. If the intergenerational mechanism is persistent then the same part of population are trapped at low levels of education and income for more than one generation.

3.5.2 Measures of education and income inequality

The main measure of educational attainment used in the literature is the highest degree of education an individual has completed. Education can be recorded as years of completed education or as an ordinal variable with the obvious ordering going from the lowest to the highest level of education. An alternative measure used by several empirical studies is also the enrollment rate for the three educational levels (primary, secondary, and tertiary education).

Regarding the macro studies, income inequality is measured by the Gini index as well as the income quartiles, while the micro studies have used the family income as a determinant of educational choices.

3.5.3 Empirical evidence

Papers analyzing the effect of income (wealth) inequality on educational attainments can be divided in two broad groups: the first one related to the macroeconomic literature analyzes the more general relationship between inequality and growth, and considers education as a key factor to increase growth. The second group of studies focuses on the effect of family income on children's outcomes and applies a microeconomic approach. However, both groups attempt to provide evidence and/or theoretical support for the idea that unequal society might harm investments in education.

Amongst others, the papers by Galor and Zeira (1993), Banerjee and Newman (1993) and Perotti (1993) pertain to the macroeconomic approach. In particular, Galor and Zeira (1993) show that, in the presence of imperfect credit markets, the wealth distribution affects investments in human capital. By developing an overlapping generation model with intergenerational transmissions they suggest that the initial distribution of wealth is crucial to determine individuals' educational choices and the aggregate output both in the short and in the long run. Along the same line of reasoning, Banerjee and Newman (1993) end up with similar conclusions. Their theoretical model suggests that the pattern of occupational (educational) choice is shaped by the initial distribution of wealth.

Perotti (1993) investigates the relationship between income distribution, democratic institution and growth. The paper mainly aimed at addressing data and estimation issues. One of Perotti's main conclusions is that there is strong empirical support for the link going from income distribution to education decisions, i.e. more equal societies have higher rates of investment in education.

In addition, Filmer and Pritchett (1999) perform an empirical analysis using household surveys for 35 countries. They demonstrate that the poverty index, their proxy for economic status of the household, is correlated with reduced school attainment in the poorest 40 percent of the population. This finding is confirmed by Flug et al. (1998). Flug's empirical investigation is based on macro panel data and suggests that credit market imperfections as well as more unequal income distribution negatively affect secondary school enrollments.

Checchi (2003) investigates the issue using an unbalanced panel of 108 countries for the period 1960-95. His main finding is a robust negative correlation between income inequality and secondary education enrolment. The effect is stronger when considering female's access to any level of education. These results support the view that poor families are prevented from accessing school by their low incomes. Thus, greater income inequality reduces access to school.

Except for the theoretical papers by Galor and Zeira (1993), and Banerjee and Newman (1993), the empirical macro-studies lack in properly addressing the endogeneity of the inequality variable, that is, when other omitted factors are correlated with both the education and inequality measure, or when the causation goes to the other way around (education causes inequality). Thus, caution is needed when interpreting these results.

The second group of studies is concerned with the effect of family income on children's educational outcomes. The idea underlying this line of research is that rich parents can spend more – or have unconstrained access to credit – than poor parents on their children's education and that these investments lead to better outcomes for their children. Although intuitive, the hypothesis has not found clear evidence in the literature: findings range from moderate to no effect of parental income on children educational attainment. It is worth mentioning that this class of studies has dealt carefully with the endogeneity of the income variable in the education equation. The income variable is endogenous since other factors, such as parents' schooling and parents' ability, might determine both family income and children's outcomes. As a consequence, these studies provide more reliable results than the macro-studies.

Ellwood and Kane (2000) focus on the effect of family background on college enrollment in United States. They find that enrollment rates have risen at the top income quartile of the parents, even though the positive effect is also explained by difference in average parental education. However, the authors did not find any effect when controlling for high school achievements. Hence, they conclude that lot of the variation in attending college is probably captured by student own ability.

Conversely, Acemoglu and Pischke (2001) identify the effect of family income by exploiting change in the U.S. distribution of wages over the period 1970-1990. Their findings suggest that, on average, an increase in family income is associated with a higher probability of enrolling in college. On the other hand, when they estimate separate effects for family income and educational enrolment according to income quartiles, they did not find support for any differential effect for poor and rich families.

Akee et al. (2010) used a permanent exogenous increase in a household's income due to a government transfer to test if larger family income affects children's education and criminal behavior. Their results indicate that changes in a household's permanent income tend to improve the overall child outcomes in terms of educational attainment at ages 19 and 21 and reduced criminal behavior at ages 16 and 17.

Using father's trade union membership and father's occupational status as instruments for income, Shea (2000) claims that income has no effect on child outcomes while Chevalier et al. (2005) find that permanent income matters in children's educational attainment. Loken (2007) uses the Norwegian oil boom of the 1970s and 1980s, which only affected a few regions of the country, as an instrument for increases in household income that is unrelated to parental characteristics. She finds that there is no effect of parents' income on child educational attainment.

Cameron and Heckman (2001) employed a different approach. They estimated a dynamic model of schooling attainment to investigate the sources of racial and ethnic disparity in college attendance. Their findings suggest that family income matters, but it has its greatest influence on forming the ability and college readiness of children and not in financing college education. Also, family income may be more important for educational transitions at younger ages.

Carneiro and Heckman (1998) critically examine the two common interpretations of the empirical evidence showing differences in college participation rates across income groups: (i) short-run credit constraints and (ii) long-term factors promoting the cognitive and non-cognitive child's ability, like family background, parental resources in a child's formative years. They show that, after controlling for student's test scores (student's proxy for innate ability), parental income has little effect on college enrollment. There is also little evidence that credit constraints explain much of the gap in college participation.

Finally, Cameron and Taber (2004) analyzed the importance of borrowing constraints on education decisions by using four different strategies: schooling attainment models, instrumental variable wage regressions, and two structural economic models that integrate both schooling choices and schooling returns. None of the methods produces evidence that borrowing constraints generate inefficiencies in the market for schooling.

The literature, reviewed in this section, has provided contrasting results on the relationship between income inequality and educational attainments. According to the more robust micro-studies, the findings range from moderate to no effect of income on educational attainment. However, when interpreting these results, one has to bring to mind that the causal direction can go both ways, the inequality affects the education but also the education might influence the inequality. Disentangling the effect of income inequality on education, it is not an easy task and requires a very robust econometric strategy. Yet, these results might depend strongly on the strategy adopted by the researchers. As such, the aforementioned conclusions should be taken with caution.

Table 5: Studies on income inequality and education

Topic	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Galor and Zeira (1993)	Theoretical model	Individuals' income O: Educational choices and aggregate output	Overlapping generations model with intergenerational transmissions and imperfect credit markets	Individuals who inherit a large enough wealth are able to invest more in human capital; credit market imperfection carry out this inequality also in the long run
Banerjee and Newman (1993)	Theoretical model	Individuals' income O: Occupational and educational choices	Static and dynamic partial equilibrium model with credit market imperfection	Initial distribution of wealth strongly shapes the occupational distribution
Perotti (1993)	67 countries, 1960-85	INE: Quintile shares in income O: School enrolment ratio	Reduced-form linear regression	More equal society have higher rates of investment in education
Filmer and Pritchett (1999)	35 countries	INE: Poverty index calculated as principal component of ownership of various assets (e.g., radio, television, refrigerator) and housing characteristics O: completed educational grade for the cohort 15-19	Descriptive analysis	Children from the poorest family show reduced school attainment
Flug et al. (1998)	122 countries, 1970-1990	Per capita income O: Average over 1970-1992 of secondary school enrollment	Reduced-form linear regression Panel fixed-effects regression	Income inequality together with credit constraints affect negatively secondary school enrollment
Checchi (2003)	108 countries, 1960-95	INE: Gini index O: Primary, secondary and tertiary enrollment rate	Panel fixed-effects regression	Negative correlation between income inequality and secondary enrollment; stronger effect for primary and tertiary education enrollment for women
Ellwood and Kane (2000)	High School and Beyond (HSB), National Education Longitudinal Study (NELS) 1988	INE: Family income quartiles O: College enrollment	Reduced-form linear regression	10% greater chance for enrollment in 4-year college moving from 1st to 2nd quartile; 4% greater chance of enrolling in any post-secondary schooling. No effect when controlling for high school achievements
Acemoglu and Pischke (2001)	USA, 1972, 1988	- Family income O: College enrollment	Instrumental variable regression exploiting change in the U.S. distribution of wages over the period 1970-1990	A 10% increase in family income predicts a 1.1% rise in chance of enrolling in college. Effects not bigger for poor and possibly bigger for families in the richest quartile
Akee et al. (2010)	USA	Family income O: Educational attainment at age 19 and 21; High school graduation	Natural experiment: comparing children in Native American families who benefited from Casino (opened on the Eastern Cherokee reservation) profits to non-Native families that did not benefit	Families receiving additional income tend to improve the overall child outcomes in terms of educational attainment at ages 19 and 21 and reduced criminal behavior at ages 16 and 17
Shea (2000)	USA	Fathers' labor earnings and parents' total income (labor, asset and transfer income)	Instrumental variable regression using fathers' union, industry and job loss variables as instruments for parents' income	Parents' money is not directly relevant to children's educational attainment

O: Years of schooling

Chevalier et al. (2005)	UK, 1993-2003	- Parental income O: Early school leaving and achievement at age 16, measured as the number of General Certificate of Secondary Education qualifications obtained at the passing grades of A to C	Instrumental variable regression using union status of the father as instrument for parental income	Permanent income and credit constraints at age 16 significantly affect children's educational outcomes
Loken (2007)	Norway, 1960, 1970 and 1980	Family income O: Years of education	Natural experiment: Norwegian oil shock in the 1970s affecting some regions is used as an instrument for family income	No effect of parents' income on child educational attainment
Cameron and Heckman (1998)	USA, 1979	Family income O: College enrollment	Dynamic discrete choice model of schooling decisions from age 15-24	Weakly relation between income and college enrollment; greatest influence of income on forming the ability and college readiness of children
Carneiro and Heckman (2002)	USA, 1979	Non-parametric nonlinear measures of parental income (quartiles) measured in adolescence O: College enrollment	Linear and instrumental variable regressions	Parental income has little effect on college enrollment; higher effect for the upper quartiles
Cameron and Taber (2004)	USA, 1979	Family earnings O: Years of schooling	Schooling attainment models; instrumental variable wage regressions; structural economic models	Effects are not statistically significant

3.6 Income inequality and voting behavior

3.6.1 Rationale

According to the *class-bias hypothesis*, economic inequality should lower the political participation of the poorer citizens. The idea is that concentrations of wealth and power are related to each other. Rich individuals will have more power than the poorer ones on the political scene, preventing debates about issues that are important for the poor fringe of the population. As the opinion of the low-income group is not taken into account for designing policies, the expected benefits from voting are lower for this group than for the high-income group leading the former to opt out of civic engagement (see Horn, 2011). The implication of the class bias hypothesis is that voter turnout and economic inequality should be negatively related to each other (Solt, 2010, and Mueller and Stratmann, 2003).

Under the assumption that (i) government policies are directly responsive to the preferences of the citizens expressed in elections and (ii) government policies affect the distribution of income, through taxation and transfers, a reduced engagement of the low-income group means that elected political leaders will put into place policies that will only reflect the preferences of high-income groups. As put by Lijphart (1997, p.1) and reported in Mueller and Stratmann (2003) low participation in elections will lead to “inequality of representation and influence [that] are not randomly distributed but systematically biased in favor of more privileged citizens – those with higher income, greater wealth and better education and against the less advantaged citizen”. This argument fits with the median voter hypothesis (see Meltzer and Richard, 1981). If turnout is skewed by income, the income of the median voter will be higher than the mean income of the country, and this will lead to a lower demand for taxes and transfers which will induce an increase of inequality (see Milanovic, 2000, Malher, 2008 for empirical tests of median voter hypothesis).⁸

The relationship between turnout and inequality is thus likely to be mutually reinforcing. A low political participation leads to economic inequality if this participation is lower among the low-income groups than for the rest of the population. In turn, rising economic inequality risks discouraging participation among low-income groups, and so on.

The *conflict theory*, on the other hand, predicts the opposite. Rising income inequality should result in more political engagement. Indeed, greater level of inequality causes disagreements in political preferences that spurs discussions about the suitable policies. These discussions are then seen to cause higher rates of political mobilizations and to stimulate more interest and participation in the political interest. As explained in Horn (2011),

⁸ Horn (2011) argues that the effect of increasing inequality on turnout might depend on whether this increase is driven by the growth of top income or, on contrary, by a relative deterioration of the situation of the low-income group. In the first case, low and medium income group could unite together to promote redistributive policies that favor the medium income group and which are more favorable for the low-income group than policies that would be designed for the most advantaged groups. Under such circumstances, the low-income group might have an additional incentive to vote. The opposite will happen if rising income inequality is due to a decrease of the income of the low-income group relatively to the rest of the population.

under the premise of the rational voter hypothesis, if inequality is low, both low and high-income groups might have a low incentive to vote if one considers that redistributive policies are the main issues decided by governments as none of the two groups has a lot to lose. The opposite will be observed if inequality is high. Anecdotal evidence for this theory might be the recent protests ‘Occupy Wallstreet’.

3.6.2 Income and voting behavior measures

The main indicator used in the empirical studies is the Gini coefficient, though measures of income inequality have been used as well, such as the 80/20 ratio or the mean distance to the median income (Horn, 2011, Mahler, 2002). Measures of voting behavior are mainly indicators of electoral participation or political preferences.

3.6.3 Empirical evidence

As explained above the relationship between civic engagement and economic inequality is likely to be circular. In this literature review, we only present the papers examining whether and how inequality affects voting behavior. In other words, we do not discuss the studies assuming that the direction of causation goes from electoral turnout to income inequality.⁹

Because of this reciprocal relationship and of the various variables that are likely to simultaneously influence political participation and income inequality (individual, political and institutional factors), the findings presented below must be interpreted cautiously.^{10 11} Most of the studies discussed below do not control for all potential confounding factors as well as for the reciprocal relationship.

Cross-country studies

The main cross-country studies are those of Horn (2011) and Lancee and Van Werfhorst (2011), Solt (2008) and Malher (2002).

Using the 2009 European Election Study, Horn (2011) explores whether economic inequality impacts on participation in elections in EU countries. Estimates are based on one point in time and include country (size of the population, electoral system, compulsory voting, etc.) and individual (age, age squared, gender) controls. The author relies on various income inequality measures (Gini, s80/20, p95/p5, and distance from the median) in order to explore the effect of rising inequalities in different parts of the distribution. Results are mixed, with the effect of inequality varying according to the inequality indicators chosen. However, in most of the cases, inequality is not significantly related to voting behavior.

⁹ See, for instance, Mueller and Stratmann (2003).

¹⁰ See Geys (2006a) for a comprehensive literature review about the factors explaining turnout.

¹¹ Lister (2007) argues that the negative association between economic inequality and civic engagement is due to cross-country differences in social norms. According to the authors, the institutions (such as Universalist welfare states) shape social norms and individual voting behavior.

Lancee and Van Werfhorst (2011), also on a sample of EU countries and using the 2006 survey of the EU-SILC survey, test the effect of inequality on civic, social and cultural participation. Their indicator of civic participation measures participation in various activities, including political parties, political associations and trade union. Their findings suggest that, conditional on observable individual characteristics and a limited number of country controls, civic participation is negatively and significantly associated with economic inequality.

Solt (2008) examines the effect of economic inequality on political interest and voting participation of citizens using individual-level data for 23 advanced industrial countries. Indicators of political engagement are drawn from various surveys (Eurobarometer, International Social Survey Program, European Election Survey, Comparative Study of Electoral Systems) and cover a period spanning from 1984 to 2000. Results again point to the detrimental effect of inequality on political engagement after having controlled for a certain number of individual and country controls.¹²

Mahler (2002) explores the relationship between electoral turnout and income inequality using measures of income distribution and voting participation at the sub-national level for a set of 12 developed countries and conclude that inequality reduces voter turnout. In comparison to Horn (2011), Lancee and Van Werfhorst (2011) and Solt (2008), in this paper, the authors can account for all observable and unobservable national-level time invariant effects (such as the institutions). Furthermore, the author made an attempt to account for the reciprocal relationship between electoral turnout and economic inequality.

Single-country studies

Galbraith and Hale (2008) examine in the USA the association between income inequality, turnout and party preferences after having accounting for other factors that might mitigate the inequality effect. The analysis is carried out at the state level over a 24 years period when the dependent variable is the turnout rate and over a 12 years period when the dependent variable measures the share of individuals having voted for a democratic party. The estimates, including state fixed-effects, show that income inequality is significantly associated with lower voter turnout and a stronger democratic vote. The authors also argue that more than raw inequality, it is the level of segregation which matters: state with higher levels of spatial-economic segregation show markedly lower self-reported turnout.

Solt (2010), using American election data and the Gini coefficient for 3 years (1980, 1990 and 2000) show that income inequality associates negatively with electoral participation, while richer people tend to vote relatively more as inequality rises, confirming the class-bias hypothesis.

¹² Note that though for most of the countries the author observes inequality for at least 2 different periods of time, they do not include country-fixed effects in their estimates.

Leigh (2005) explores with an Australian dataset the relationship between party preference and a set of individuals and neighborhood-level factors. OLS (or probit) estimates suggest that the level of income inequality in the neighborhood is not significantly associated with specific party preferences while the rich neighborhood are characterized by a higher probability to vote for the conservative party. However, when the author accounts for the potential endogeneity of the neighbor effect (i.e. where individuals choose to live is often related their policy preferences) the probability to vote for the labor party increases with higher neighborhood inequality.¹³

Yamamura (2009) uses panel data at the prefecture level in Japan and finds that voter turnout is significantly associated with economic inequality and age based heterogeneity. This result holds even after including prefecture-level fixed effects.

In conclusion, most of the cross-country studies, based on a set of EU or advanced countries, conclude in favor of a negative effect of income inequality on voter turnout. Empirical analyses based on a single country tend to come to the same conclusion. We note, however, that none of these country-specific studies is based on European countries.

¹³ Following Dustmann and Preston (2001), Leigh (2005) instruments neighborhood-related variables by equivalent variables at a higher level of aggregation (region). The idea is that individuals decide where to live at the local level but are more constrained at the regional level (employment situation, family-related issues).

Table 6: Studies on income inequality and voting participation

Topic	Data	Inequality measure (INE) Main outcome (O)	Method	Results
Galbraith and Hale (2008)	USA, 1969-2004	INE Gini O: Political engagement(democratic share), voter turnout	Cross states estimates, year 2000 Cross states estimates with state fixed effects (1964-2004) Estimates include state-level controls	Income inequality at the state level is associated with a lower voter turnout and a stronger democratic vote
Solt (2008)	Cross-country 23 advanced industrial countries 1984-2000 (time coverage varies with countries)	INE: Gini O: Political engagement: political interest, political discussion and electoral participation	Estimates at the individual level including individual and country controls Logit	Country's income inequality reduces individual political engagement The effect increases with relative declining income
Horn (2011)	EU countries, 2009	INE: Gini, s80/s20, poverty rate, p95/p5, mean distance from the median O: Voter turnout	Logit, model, 2 step model and hierarchical model Include individual controls and country level controls	The effect of inequality on voter turnout depends on the selected inequality indicators. In most of the cases, the coefficient is not significantly different from zero
Lancee and Van Werfhorst (2011)	EU countries, 2006	INE: Mean distance to the median income (below and above the median separately) O: Social, civic and cultural participation	Include individual covariates and country measures of income dispersion	Civic participation is significantly associated with economic inequality, on the other hand, this does not seem to be the case for social and cultural participation.
Malher (2002)	12 developed countries, late 1980s/early 1990s, mid-1990s,	INE: Intra-regional inequality: ratio of the income at the 90th percentile to that of one at the 10th percentile, Gini, ratio of the median income of a given region to the median income of the region	Analysis done at the regional level 3SLS, allows for reciprocal relationship Number of sub-national controls	Results suggest that inequality reduces turnout and also that turnout impact on inequality
Yamamura (2009)	Japan, 1989-2003 prefecture-level panel data	INE: Gini O: Voting behaviour	Prefecture fixed effects Prefecture-level covariates	Voting behavior is influenced by income inequality and age-based heterogeneity
Leigh (2005)	Australia 1966-2001	INE: Gini O: Labour versus conservative parties	Probit 2SLS estimates	Living in an unequal neighborhood increases the chance to vote for a left-wing party (2sIs estimates)

3.7 Income inequality and female labor participation

3.7.1 Rationale

This paragraph deals with the question whether income inequality does affect labor market participation of women. However, screening the literature, it becomes clear that the relationship between inequality and female labor participation is mainly seen in the light of the effect of women's earnings on family income and on overall income inequality. To our knowledge, there is neither theoretical nor empirical evidence on how income inequality might affect the participation rate of women in the labor force. Hence, the causality is seen to run from increased labor participation of women to income inequality and not the other way around. Therefore, in the following paragraphs we briefly summarize the literature and evidence available of the contribution of female labor market participation on reducing income inequality.

3.7.2 Empirical evidence

There are quite numerous studies investigating to which extent the increased participation of women in the labor market has an influence on income inequality (Esping-Andersen, 2005, Burtless, 1999, Harkness et al., 1997, Karoly and Burtless, 1995, Douglas, 1990, and Blackburn and Bloom, 1987). Various conclusions can be drawn from this literature. Generally, women's participation in the labor market increases families' average income. However, it is not clear whether this then translates into increased equality of income since this depends on the other family earnings. If most working women are married to low-paid men, then increases in female labor participation have an equalizing effect. However, if participation of women in the labor market is equally distributed by low-paid and high-paid husbands, then increases in female labor participation might actually increase income inequality.

Moreover, researchers noticed that in recent years there has been a change in the family structure with increasing numbers of single-adult households, i.e. single working mothers. In addition, there seems to be a strong trend of marital educational homogamy or assortative mating, i.e. that married couples tend to have a similar education level and hence similar earnings. Note that the degree of assortative mating might be country specific and most studies on the effect of female labor participation on inequality employ evidence from the U.S., Canada and Sweden. The consequences of assortative mating are as follows. If high-skilled women are married to equally high-skilled men and if these women participate in the labor market, then through their high earnings income inequality increases (Karoly and Burtless, 1995, and Maxwell, 1990). This implies that only if disproportionately more low-skilled women participate in the labor market (than high-skilled women) will female labor participation have an equalizing effect on income (Esping-Andersen, 2005). For recent evidence on current trends in the EU in the labor market participation rates of women depending on their husbands earnings as well as on assortative mating see a recent OECD study (OECD, 2011, chapter 5), as well as general discussions on the relationship between earnings and income inequality in OECD (2011) as well as Salverda (2011, chapter 3). From the OECD report one can conclude that there was indeed a trend towards more assortative mating but that this contributed only moderately towards the

rises in income inequality. The main driver of income inequality, according to the OECD, remains unequal earning by men (OECD, 2011, p. 194-195).

In conclusion, there is neither clear theoretical nor strong empirical evidence that income inequality affects female labor market participation. For the reverse causation, i.e. an effect of female labor market participation on income inequality, the literature suggests that only if disproportionately more low-skilled women participate in the labor market (than high-skilled women) will female labor participation have an equalizing effect on income.

4. Conclusion

This report presents a critical reading of the literature on the impact of income inequality on important social outcomes related to (i) well-being, (ii) criminality, (iii) health, (iv) social capital, (v) education, (vi) political participation and (vii) female labor market participation. In particular, the aim of this report was to look into sound empirical studies - based on multivariate analysis - which examine the effect of income inequality on these important social outcomes. Thereby, this report provides a first step into understanding more clearly how rising income inequalities might affect societies and established widely accepted knowledge that inequality is a toxic element of today's European societies.

The upshot of this literature review is that higher criminality, reduced political agency and, to some extent, lower social capital formation and well-being appear to be tangible illustrations of the wastage produced by rising income inequality. In addition, there are a number of self-reinforcing loops linked to inequality. A clear illustration of this is the role of inequality in reducing the voting participation of the low income groups and the concomitant consequences in terms of redistributive policies and therefore on income disparities.

In more detail, the literature review has highlighted the following elements:

The effect of income inequality on happiness critically depends on the perceived country level of mobility. If income mobility is high, such as in the USA, income inequality tends to be positively associated with reported well-being as individuals tend to consider that they will eventually reach a higher income. The opposite is observed in low mobile countries (i.e. typically in European countries) because in those countries individuals feel that it is impossible to reach a higher level of income.

The majority of the studies focusing on the relationship between the income distribution and criminality conclude in favor of a detrimental effect of income inequality on criminal behaviors. The rationale behind these findings might be based on economic considerations – income inequality increases the gain derived from a criminal act –and/or on a sentiment of frustration of the less well-off individuals when they compare their situation with respect to the wealthier ones.

Empirical analyses of the harmful effect of income inequality on health are usually not conclusive, at least among wealthier European countries. This goes in line with the fact that there is still not a widely accepted rationale for explaining why income inequality should impact on health and even, several scholars tend to suggest that the causality runs in the other way around, from health status to income inequality.

In virtue to the aversion to heterogeneity theory, heterogeneous societies should be characterized by fewer contacts and in consequence, by lower levels of social capital. This prediction, also confirmed by adjacent theories, appears

to be empirically validated in cross-country studies as well as in papers focusing on the US context. Findings specific to EU countries are limited and less conclusive.

The relationship between income inequality and educational attainment might go in both directions. On one hand, rising inequality should encourage investments in education through increased returns to education. On the other hand, it might prevent these investments for those people belonging to the bottom of the income distribution because of resources' constraints. Regarding the latter mechanism, the empirical studies reviewed suggest a modest effect or no effect of income on educational outcomes (attainment, enrollment, etc.). However, when interpreting these results caution is needed, because conclusions rely strongly on the econometric approach used by the researchers.

The relationship between turnout and inequality is likely to be mutually reinforcing because, according to the class-bias assumption, the benefits from voting are lower for the low-income group, reducing the incentive for this fringe of the population to vote. If voter turnout is skewed by income, the policies implemented will favor the well-off group (median voter hypothesis), thus participating to the intensification of income disparities. In turn, rising economic inequality will discourage participation among low-income groups, and so on. These predictions are confirmed by the majority of cross-country and single-country based studies.

There is neither a sound theoretical base nor empirical evidence of an effect of income inequality on the participation rate of women in the labor force. The causality is found to run instead from labor participation of women to income inequality.

This report is a first step of a more comprehensive project aiming at analyzing the socio-consequences of rising income inequalities in Europe, and will be complemented with quantitative bivariate and multivariate analyses of the relationship between income inequality and some of the social outcomes discussed. The empirical work will cover the 27 EU countries and will be carried out at the sub-national level (NUTS 1 level).

The results of the literature review offer important guidelines for the succeeding quantitative step to be carried out. In particular, while each of the seven social outcomes reviewed in this document are important constituencies of a 'healthy' society, and hence worthy of being examined in a more thorough way, it seems reasonable to restrict further quantitative analyses to the most relevant ones. More precisely, while the bivariate analysis will be done for the all social outcomes, the multivariate analysis will focus on the harmful effect of income inequality on political agency and criminality.

The choice of these two social outcome variables for the multivariate analysis is based on two arguments. First, political participation and criminality constitute important proxies for the functioning of a society. Secondly, besides their political relevance, a clear causal relationship can be more easily postulated for these two social outcome variables. In particular, the multivariate analysis at the sub-national level could add substantially to the understanding of the social challenges caused by rising inequalities in Europe.

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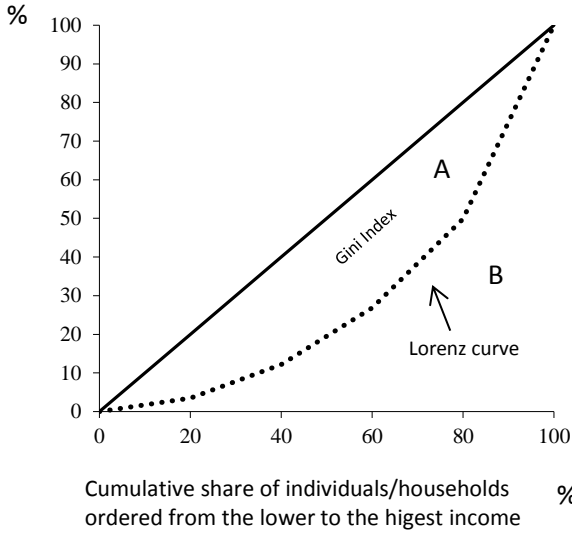
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Table 7: List of the main inequality indices used in the reviewed studies

Inequality Measure	Description of the Inequality Measures
<p>Lorenz Curve and Gini Coefficient</p>	<p>The Lorenz curve maps the cumulative income share on the y-axis against the cumulative population share ordered from the lowest income to the highest one on the x-axis. If the Lorenz curve is a diagonal, this implies that the distribution of income is distributed equally across the population.</p>  <p>The Gini coefficient corresponds to the area between the diagonal and the Lorenz curve, expressed as a percentage of the area between the line of perfect equality (diagonal) and the line of perfect inequality (x-axis). If the area between the perfect equality line and the Lorenz curve is A and the area under the Lorenz curve is B, the Gini coefficient is $A/(A+B)$.</p> <p>The Gini coefficient ranges between 0 (perfect equality) and 1 (perfect inequality).</p>
<p>Entropy indices Theil Coefficient</p> <p>Mean log deviation index MLD</p>	<p>The generalized entropy class of inequality measures $GE(\alpha)$ can be expressed as follows</p> $GE(\alpha) = \frac{1}{\alpha^2 - \alpha} \left[\frac{1}{n} \sum_{i=1}^n \left(\frac{y_i}{\bar{y}} \right)^\alpha - 1 \right]$ <p>where \bar{y} is the mean income, y_i is the income of the individual/household i and n is the number of individuals/households.</p> <p>The parameter α in the GE class is the weight given to distances between incomes situated in different parts of the income distribution. With lower values of α, GE is more sensitive to changes in the lower tail of the distribution while higher values of α correspond to a GE more sensitive to changes that affect the upper tail.</p> <p>The Theil index corresponds to entropy index with α being equal to one and is given by:</p> $Theil = GE(1) = \frac{1}{n} \sum_{i=1}^n \left(\frac{y_i}{\bar{y}} \right) \ln \left(\frac{y_i}{\bar{y}} \right)$ <p>It is possible to decompose this index into the part that is due to inequality within areas (i.e. regional) and the part that is due to differences between areas (i.e. between regions).</p> <p>The mean log deviation index (MLD) corresponds to the entropy index with α being equal to zero and is given by:</p> $MLD = GE(0) = \frac{1}{n} \sum_{i=1}^n \ln \left(\frac{y_i}{\bar{y}} \right)$
<p>Atkinson Index</p>	<p>The Atkinson index A_ε is an inequality measure given by :</p> $A_\varepsilon = 1 - \left[\frac{1}{n} \sum_{i=1}^n \left(\frac{y_i}{\bar{y}} \right)^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}}$ <p>where \bar{y} is the mean income, y_i is the income of the individual/household i and n is the number of individual/households. ε indicates the degree of aversion to disparity. When $\varepsilon > 0$, there is a preference for equality, i.e. an aversion to inequality. As ε rises, more weight is attached to income transfers at the lower end of the income</p>

	<p>distribution and less weight to transfers at the top of the income distribution. The Atkinson index ranges between 0 and 1, with 0 indicating perfect equality and 1 maximum inequality.</p>
Ratio of 90/10, 80/20, 90/50, 50/10	<p>The 90/10 ratio is the ratio of the average income of the richest 10 percent of the population divided by the average income of the bottom 10 percent. Similarly the 80/20 ratio compares the average income of the richest 20% to the poorest 20% of the population.</p> <p>The same rule applies for measuring the 90/50 and 50/10 ratios.</p>
Robin Hood Index	<p>The Robin Hood Index is the income that would have to be redistributed (taken from the richer half of the population and given to the poorer half) for the society to be perfectly equal.</p> <p>The Robin Hood index is based on the Lorenz Curve and is equivalent to the maximum vertical distance between the Lorenz curve, and the perfect equality line (diagonal).</p> <p>The Robin Hood index RH formula is as follows:</p> $RH = \frac{1}{2} \sum_{j=1}^q \left \frac{y_j}{y_{total}} - \frac{a_j}{a_{total}} \right $ <p>where q is the number of quantiles, a is the width of the quantile, y_j is the income in the quantile j and a_j is the number (absolute or relative) of income earners in the quantile i. y_{total} is the sum of incomes of all N quantiles and a_{total} is the sum of the income earners in all N quantiles.</p> <p>The Robin Hood index ranges from 0 (complete equality) to 100 (complete inequality).</p>
Variance/coefficient of variation	<p>The variance (σ^2) is a measure of how far each value in the data set is from the mean (dispersion)</p> $\sigma^2 = \frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2$ <p>where y_i is the individual/household income and \bar{y} is the average income and n is the number of individuals/households</p> <p>It is also possible to compute the coefficient of variation CV as follows:</p> $CV = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2}}{\bar{y}}$

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Abstract

In 2009, two epidemiologists, Wilkinson and Pickett, published a book entitled “The Spirit Level, Why More Equal Societies Almost Always Do Better” in which they claim that inequality and its acute perception by the average EU citizen is a toxic element of today’s European societies and one that seems to be associated with decreased levels of trust, civic engagement and participation, as well as to a host of other social challenges from poor health to crime, to underage pregnancies. Despite Wilkinson and Pickett’s intuitively convincing story of the link between higher income inequality and worse social outcomes, the empirical tests are based on simple bivariate correlations, implying that the authors fail to control for all the other numerous factors, which might have had an impact on both the social outcomes and income inequality. In doing so, the empirical associations reported in their book are likely to lead to misleading causal inferences. Nonetheless, Wilkinson and Pickett’s book attracted a lot of attention and called for a more careful analysis of the consequences of rising income inequality. The aim of this report is, hence, to look into sound empirical studies – based on multivariate analysis – which examine the effect of income inequality on important social outcomes related to (i) well-being, (ii) criminality, (iii) health, (iv) social capital, (v) education, (vi) political participation and (vii) female labor market participation. The upshot of this literature review is that higher criminality, reduced political agency and, to some extent, lower social capital formation and well-being appear to be tangible illustrations of the wastage produced by rising income inequality. In addition, there are a number of self-reinforcing loops linked to inequality. A clear illustration of this is the role of inequality in reducing the voting participation of the low income groups and the concomitant consequences in terms of redistributive policies and therefore on income disparities.

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