22 May 2018

Draft – Please do not quote

Rich and Poor:
Exploring the Limits of Inequality

Pierre CONCIALDI[1]

Institut de recherches économiques et sociales (IRES [2])

25th FISS International conference
Sigtuna
6-8 June 2018

[1] pierre.concialdi@gmail.com – pierre.concialdi@ires.fr
[2] Postal address : 16, Bd du Mont-d'Est 93192 Noisy-le-Grand Cedex FRANCE - Tel : 33 (0)1 4815 1917

Abstract

The paper explores the socially acceptable limits that could be set, as a policy objective, to economic inequality. It first briefly discusses the limits to growth and inequality, arguing that economic growth can no more be the core strategy for reducing inequalities and that, as a principle, an upper limit should be set to inequality. Next section discusses the contributions of income and wealth to the satisfaction of human needs and explains why the focus of the paper is on income inequality. The following section proposes a methodology to identify the socially acceptable limits to inequality. Although such boundaries are necessarily normative, the paper provides a rationale that highlights the necessity to renew our conceptual frameworks to deal with economic and social issues. The final section provides some estimates of upper and lower limits to income inequality for each of the EU countries and compares the lower limits so derived with the usual statistical poverty lines. The conclusion summarizes the main results and identifies some directions for future research.

Introduction

Despite the unprecedented growth in the worldwide GDP per capita that has been observed over the past two centuries, the issue of economic inequality is still at the forefront of the political agenda. This is not just because inequalities have increased in many countries over the past decades[3]. This is also because the level of economic inequality remains high and, there is no doubt in our view, too high. At the lower end of the income distribution, public policies did not succeed in eradicating poverty even in the most developed countries of the world. At the upper end, some people receive incomes that may be considered outrageously indecent. The picture becomes very alarming if we take a global view of income inequalities, observing that billions of people around the planet cannot just meet their basic needs[4].

There is thus no doubt that the huge challenge of sustainable wellbeing is still just in front of us as it has been for long. This challenge comes together with the growing threat of climate change that will most probably, at the very least, seriously limit economic growth in the next future since economic growth is the key driver of greenhouse gas emissions. We cannot therefore think about the issue of inequality in the same way as we did in the past when economic growth was supposed to reduce inequalities.

The growing threat of climate change and the challenge of extreme global inequalities are closely connected issues. Two very recent books have highlighted this point. Kate Raworth's *Doughnuts Economics* (2017) popularized the idea that sustainable development should be bounded within the two rings of a "doughnut". The inner ring of the doughnut corresponds to a social foundation, which represents the minimum of level resources needed to lead a good life, whereas the outer ring defines an upper limit of need satisfaction that should take into account the Earth's environmental limits. In his last book *Heat, Greed and Human Need* (2017), Ian Gough provides probably today the most comprehensive and thorough analysis of these problems by linking as closely as possible, at both theoretical and empirical levels, the need for sustainable wellbeing and the need for sustainable environmental development.

In this short paper, the focus is on economic inequality, an issue that is intimately linked to sustainable wellbeing. The objective is to propose a methodology that allows to unveil the socially acceptable limits that could be set, as a policy objective, to inequality. It is important here to stress the fact that we are looking for *socially acceptable* limits; this is a core issue for the public debate and this is the main objective of the paper. This is of course a fundamentally normative question. However, it does

[3] See for instance Dabla-Norris, Kochhar, Suphaphiphat, Ricka and Tsounta (2015); Kelley (2015), World Bank (2016).

[4] World Health Organization: http://www.who.int/mediacentre/factsheets/fs392/en/

not follow that this issue can only be tackled in a purely arbitrary way. Normative choices should not be confused with arbitrary ones: some norms, whether implicit or explicit, may be argued to be better than others. This is a crucial discussion. Otherwise, we would just end up with a conflict of opinions based on purely subjective preferences.

The paper is in no way theoretical. It is essentially empirical in the sense that it does not discuss the axiomatic foundations of the methodology that we propose. The paper just tries to provide some concrete answer to a question that has, we think, an intuitive meaning for people who feel concerned with the detrimental effects of excessive inequalities.

The paper is organized as follows. It first briefly discusses the limits to growth and inequality, arguing that economic growth can no more be the core strategy for reducing inequalities and that, as a principle, an upper limit should be set to inequality. Next section discusses the contributions of income and wealth to the satisfaction of human needs and explains why the focus of the paper is on income inequality. The following section proposes a methodology to identify the limits of inequality and the paper further explicates the rationale behind the methodology; this highlights the necessity to renew our conceptual frameworks to deal with economic and social issues. The final section provides some estimates of upper and lower limits of income inequality for each of the EU countries. The conclusion summarizes the main results and identifies some directions for future research.

1. Growth and inequality: facing the limits

The relationship between growth and inequality is a much debated issue in economic literature. We do not pretend here to provide any definitive answer to this issue. We just would like to highlight some of the most consensual empirical results concerning this debate and, more precisely, what can be said about this issue at a worldwide level.

Inequalities can be assessed at a national (within country) or international (between countries) level. Or they may be considered at a more global level - on which we will focus in this section - combining these two dimensions[5]. Despite the large efforts that have been devoted to this issue over the past 20 years or so, measuring these global inequalities remains a work in progress and we should be careful when interpreting these statistics.

Over the long run, however, three consensual results emerge (Bourguignon & Morrisson, 2002; Milanovic, 2012). First, the growth in average per capita GDP that has been observed since the Industrial Revolution has been undoubtedly associated

[5] This concept of global inequality corresponds to "concept 3" of inequality defined by Milanovic (2005).

with a sharp rise in global inequalities. Second, the main factors behind these inequalities changed dramatically. Whereas inequality was mainly driven two centuries ago by income differences within countries ('class' differences), the bulk of income inequality comes today from differences between countries ('locational' differences). Finally, considering the level of inequality, we very probably face today the highest absolute global inequality than at any point of time in human history.

If we therefore consider the relationship between growth and inequality at this global level, there is no doubt that the unprecedented growth that has been observed since the Industrial Revolution did not translate in lower global inequalities. On the contrary, it was associated with a sharp rise in global inequalities. Some nations, especially in the developed world, may have experienced a decrease in income inequality. But this was, so to say, at the expense of other forces that have led to a dramatic increase in global inequalities. This means that, while the average global GDP per capita has increased, an ever-growing part of this growth has been "wasted" in inequality[6]. In a world where the scarcity of resources is an urgent challenge, this trend becomes more and more problematic.

Whether this long-term trend in rising global inequalities has stopped or even reversed over the past decades remains a controversial issue, not the least because of the strong methodological difficulties in measuring these inequalities (Anand & Segal, 2008). Available evidence suggests however that global inequality decreased slightly since the 1980s (Anand & Segal, 2015; Milanovic, 2012). What can we expect for the future?

Modelling the future of income inequalities, Hellebrandt and Mauro (2015) define a 'baseline scenario' where the growth of the worldwide per capita GDP would be 2.6% a year over the next twenty years, which means doubling the global output. In this scenario, the Gini coefficient would slightly decrease from .65 in 2013 to .61 in 2035: global inequality would still be well above the Gini coefficient for the clear majority of within-country distributions. This potential decline essentially captures the gradual catching up of emerging and developing countries[7].

However, one may cast serious doubt about the feasibility of this scenario. Over the past two centuries, such a strong growth in the per capita GDP has only been observed over a very short and specific period, in the aftermath of WWII, between 1950 and 1980 (Table 1). Considering the huge challenge of climate change, one may

[6] See section 3.

[7] An alternative scenario assuming some convergence between countries in the economic growth rate ('reversing to mean' scenario) would leave global inequality virtually unchanged. The Gini coefficient would be .642 in 2035 down from .650 in 2013.

argue that such a high growth rate is not sustainable in the future and would put unacceptable pressures on material resources and environment.

Table 1
World GDP per capita
(Annual real growth rate, %)

1-1820	0,0
1820-1950	0,9
1950-2015	2,0
1950-1980	*2,6*
1980-2015	*1,4*

Source: Maddison up to 2008[8].
Author's update for the period 2008-2015

Various policies can be implemented to cope with this environmental challenge and these policies certainly do not solely rely on a reduction or a slowdown in economic growth (Gough, 2015 and 2017). But it is now widely accepted that some slowdown of economic growth - or more probably a degrowth strategy - would be part of the policy package if we seriously want to succeed in reducing greenhouse gas emissions to mitigate the effects of climate change[9].

In sum, notwithstanding the fact that economic growth has hardly been in the past a "solution" for reducing economic inequalities – as most advocates of the so-called "trickle-down economics" claim - one can argue that it will certainly not be the case in the future. We must rethink our approach to economic inequality in the light of this environmental constraint: the reduction in economic inequality cannot be left to the 'invisible' hand of market forces that would push economic growth. Reaching the limits of economic growth, public policies aimed at improving social welfare will have to rely more and more on specific public policies directly targeted to reducing inequality.

Whereas it is now widely accepted that there is some limit to economic growth, there is no such consensus on economic inequality. On this issue, public policies remain 'in the middle of the stream'. Nowadays, most national governments and international organisations are committed to the reduction - if not the eradication - of poverty, thus implicitly recognizing that a minimum level of needs' satisfaction is

[8] The Maddison-Project, http://www.ggdc.net/maddison/maddison-project/home.htm, 2013 version.

[9] There are three main ways of mitigating climate change: improve the emissions-efficiency of production, reduce total consumption levels (the "degrowth strategy") and encourage low-emission consumption patterns (Gough, 2015). None of these three strategies will succeed alone in coping with this challenge, and there is therefore a need for some slowdown of economic growth. Consequently, the 'baseline scenario' of Hellebrandt and Mauro cannot be taken as a reasonable one.

a fundamental right of people. However, one can hardly find any such commitment when it comes to setting an upper limit to inequality. This sounds quite strange since both issues go - so to say - hand in hand. Indeed, if there were no limit to inequality, we would implicitly accept that a one and only people (the 'winner'?) could get all and that, consequently, the rest of the population would have nothing.

The argument is a simple and fully logical one and has already been made by the World Bank in its 1990 report on poverty. In this report, the WB briefly discusses the relationship between poverty and inequality and rightly acknowledges the basic fact that maximum inequality would not be socially sustainable: "At maximum inequality, one person has everything and, clearly, poverty is high". Consequently, if we have some aversion to poverty, we should recognize that some limit should be put to inequality[10].

Arguing for some limit to inequality - i. e. rejecting the perspective of maximum inequality and its potential detrimental consequences - does not imply that we stand on the opposite extreme view, advocating for maximum equality and no inequality at all. Indeed, throughout the paper, we are looking for lower and upper limits to inequality, thus leaving room for some inequality. However, we totally disagree with the conclusions of the World Bank concerning the scenario of minimum equality. In the report already quoted, the World Bank considers that "minimum inequality (where all are equal) is possible with zero poverty (where no one is poor) as well as with maximum poverty where all are poor". This is obviously not true if we consider the poverty standard defined by the World Bank itself at that time ($1 per day). The same conclusion holds today with the additional poverty lines ($3.2 and $5.5 per day) that are now considered by the World Bank, following the recommendation made by Atkinson and the Commission on Global Poverty[11] (World Bank, 2017). Minimum inequality would not lead in today's world to poverty for all, even tough it would probably challenge the way of life of most populations, especially in the developed world.

From the above discussion we can draw three main conclusions:

- The issue of inequality can no more rely on a "growth strategy" and cannot be left to the invisible hand of market forces that drive economic growth. To seriously deal with this issue requires some sound public policies;

[10] There are also other strong ethical and moral arguments that justify the right to minimum need-satisfaction and, consequently, the necessity to set a limit to inequality. (Doyal & Gough, 1991).

[11] A $2 (PPP) poverty line represents an annual per capita income of $730 which is approximately the average per capita income of the poorest countries in the world. A $5.5 poverty line would approximately yield a $2000 annual per capita income, far below the world average GDP per capita in 2015 (around $15000 in PPP constant 2011 international $) and also far below the average per capita income derived from household surveys ($5500 in 2013).

- As a principle, the idea that some upper limit to inequality is necessary can hardly be rejected. This is certainly the case if we agree that there is some aversion to inequality in the society. The crucial question is not therefore whether we should set (or not) some limits to inequality, but at which level to set such just and adequate limits;
- Considering the main drivers of global inequality today, the most efficient way to tackle this issue is very probably to address this problem at both national and international levels.

This last point, however, cannot be addressed *in abstracto*. Defining a policy objective to set some limits to economic inequality can only make sense within some society, that is within a community that shares some common values and goals and that may be identified as such, not the least because there are already some existing institutions in charge of working out some public policies. Nations provide today the most relevant framework for, first, defining policy objectives aimed at reducing income inequalities between members of the society and, second, evaluate the effectiveness of public policies in this regard. At the international level, we do not yet have such institutions. In this paper, we therefore limit our analysis to inequality within nations. We think that the issue of international inequalities - because of its utmost importance - should deserve a specific analysis; moreover, this issue raises also a lot of specific empirical questions that should be fully discussed.

2. Needs, income and wealth

If we are interested in economic inequality and in the limits that could be put to it, this is not because we feel concerned with inequality *per se*, as an abstract feature of human societies. Our interest lies in the fact that excessive inequality, as it has been stressed above, inhibits the capacity of some people to meet their basic needs and might therefore be harmful to them and, consequently also, for the society more generally[12].

There are two fundamental dimensions of economic inequality, income and wealth; these are just means and do not constitute any end. In the paper, the focus in on income inequality. We explain in this section the reasons, as well as the limitations, of this choice by briefly discussing the contribution of income and wealth to the satisfaction of human needs. Whereas it is common to define income as a flow and wealth as a stock, the concept of need allows us to go beyond this basic distinction and to make things a little clearer.

Let's start with income. All people need to have access to a minimum basket of goods and services to meet their basic needs and participate in society. In the world we live today, especially in developed countries, most of the necessities of life must be

[12] We briefly argue in that way in Concialdi (2018).

bought on markets and this requires some money. In that sense, people absolutely need some minimum income.

The same cannot be said for wealth. One can make a living and fully participate in society without possessing anything. This is fortunate since most people in the world do not indeed possess any asset. The Gini coefficient for the global distribution of household wealth is estimated to be around 0.8, much higher than for the income distribution, and one half of the world population 'possesses' less than 4% of this global wealth[13] (Davies *et al.*, 2009). These people, whatever deprived they may be, could escape this situation with a sufficient income. They do not need to be given any asset. And this also holds for all human beings: no one can claim that he really needs to possess any asset[14].

This does not mean that some forms of assets do not directly contribute to the satisfaction of human needs. The most prominent example is housing which is the single most important component of personal wealth in most countries, sometimes making more than 50% of the household wealth (Davies *et al.*, 2009). However, one does not need to own her house to enjoy a proper housing. More generally, some assets may provide a flow of services that satisfy human needs, but it does not follow that individual property is needed to have access to these services.

In sum, individual property is not a prerequisite for satisfying human needs whereas a minimum individual income is. And for that reason, we may rightly be interested in income inequality first if we are concerned with the satisfaction of human needs.

However, one cannot ignore that wealth inequality structures the distribution of power within society and, consequently, the distribution of incomes. From a policy perspective, it can thus be argued that a sound policy aimed at limiting income inequality can only be achieved if some policy measure is also taken at the structural level of wealth inequality. Otherwise we might end up by scooping the water out of an ever-flowing boat. Hence, focusing on income inequality as we will do throughout this paper is just a starting point to think about economic inequality more generally, in a more comprehensive and proper way.

Historical experience suggests, however, that policies focused on income inequality can significantly improve the wellbeing of societies even though the structural forces that contribute to the production and reproduction of economic inequality remain

[13] These figures refer to global wealth measured using PPP exchange rates. Measures based on current exchange rates lead to a higher concentration: the Gini coefficient is 0.892 and the bottom half of the world adult population possesses hardly more than 1% of global wealth (Davies *et al.*, 2007).

[14] The only exception relates to individual (or private) property concerning what we might call domestic property, that is the property of these usual objects that we used in the daily life and that are part of the day-to-day environment which procures, more generally, a feeling of security.

untouched. The construction and development of social security systems in developed countries after WWII illustrates this point very clearly. And this is no coincidence that some people name social security the 'property of the poor'. Despite the many attacks against social security systems over the past decades, these systems remain a powerful tool to mitigate the detrimental effects of unleashed market liberalism. In other words, the 'property of the poor' could resist, at least up to now, to the huge force of the property of the rich. This is not a minor point. Thinking about income inequality can help us lie the foundations of other types of institutions that would supplement (and *not* substitute) social security systems.

3. An exploratory methodology

In the literature on economic inequality, there are very few contributions addressing directly the issue of inequality limits. Concerning the definition of a lower limit, there is no doubt that the literature on poverty has provided very valuable insights on the definition of poverty at a theoretical or conceptual level. However, empirical measures of monetary poverty lines remain purely statistical ones and do not rely on any sound rationale. They are therefore opened to endless debates[15]. Concerning the upper limits of inequality and the definition of a richness line, both conceptual and empirical issues have scarcely been discussed and most estimates are purely statistical ones[16].

Medeiros (2006) made a significant step towards the conceptual definition of a richness line. He proposed to explicitly link the definition of this line to the poverty line. The argument made by Medeiros is that we should have complete aversion to poverty and that it would therefore be necessary to eradicate poverty. This would necessitate some transfer from the richest to the poorest. To organize this transfer, Medeiros proposes to start by reducing the income of the richest to the income of the next richest and to continue the same process up to the point where we have got the necessary transfer. At this point, we have identified an income limit where all the individuals with pre-transfer incomes higher than this limit have been set. This limit can be defined as a richness line which is directly related to the poverty line. To empirically compute this richness line in the case of Brazil, Medeiros uses a conventional and arbitrary poverty line. This is the main drawback of this methodology since there is no *a priori* social agreement on such a poverty line which is a purely statistical one.

To overcome this problem, we followed the methodology proposed by Medeiros, but instead of inputting an arbitrary poverty line, we used the reference budgets that

[15] Some surveys gather the opinion of people about this issue and may be used to assess the relevance of such poverty lines (see note 27 below).

[16] Medeiros (2006) provides a survey of these estimates. We also briefly discussed this point (Concialdi, 2018).

have been developed in the recent years in the UK and in some other countries (Concialdi, 2018). The main advantage of reference budgets is that they define a decent minimum income that is socially grounded through the whole – and quite detailed – process of their construction. This process draws, on one hand, on the expertise of citizens concerning the definition of their needs and the way these needs can concretely been satisfied (definition of need satisfiers) and, on the other, on the codified knowledge of experts that help citizens be aware of the most efficient way to satisfy these needs. The practical drawback of this methodology, however, is that it is time and money consuming so that very few countries have developed such reference budgets up to now.

In this article, we propose a methodology that can be applied to all (or most) countries and that is also socially grounded since it is based on some collective preference. The basic idea of this methodology is, first, to define a transfer principle and, second, to simulate the effects of this transfer process on the income distribution up to the point where the additional social gain of the transfer is equalizing the additional individual cost of this transfer for people who bear it. Concretely, the methodology works in the following way.

Let's consider a transfer principle that involves both extremes of the income distribution, the richest and the poorest people. At the beginning of the transfer process, some income is taken from the richest individual to improve the situation of the poorest up to the income of the next poorest. The transfer would very probably be quite insignificant for the richest individual and it could perhaps cause some minor inconvenience or unpleasantness. But it could not be seriously argued that this would be harmful to him. For the poorest individual, however, one pound is totally worth one pound to satisfy her needs and this would be a real improvement in her living conditions, whatever tiny the transfer may be at this very early stage.

This intuitive feeling of social justice translates, in the standard economic vocabulary, in the fact that the marginal utility of income is higher for the poorest than for the richest and that a transfer from the richest to the poorest would, for that reason, increase social welfare. If we agree with this view, we can therefore continue this hypothetical transfer process step by step to raise the floor while, at the same time, decreasing the ceiling. The question is: when should we stop this transfer process?

To answer this question, we propose to take advantage of the property of the inequality index that has been proposed by Kolm (1969; 1976) and Atkinson (1970) in apparently unrelated papers[17]. One important feature of this index is that it cannot

[17] The academic literature usually refers to the Atkinson index. However, the original paper by Kolm was presented in 1966 in an international conference whereas the article by Atkinson was published in 1970. We will refer in this paper to the Kolm-Atkinson index. The Atkinson index is invariant if all incomes vary in the same proportion as the central version of the Kolm index is.

be used without an explicit coefficient reflecting the aversion to inequality, thus recognizing the normative dimension of any inequality measure. Another very interesting property of this index - and the one that we will use - is that it yields a measure that has a concrete signification and that can be easily interpreted at a macro level. For instance, if the Kolm-Atkinson index is 0.2, this means that 20% of total income could be sacrificed with no loss of social welfare if incomes were equally distributed. In other words, 20% of total income is 'wasted' in inequality. This value is often referred to in the literature as the social cost of inequalities. The core concept of the Kolm-Atkinson index is the equally-distributed equivalent income Y(ede) that measures the average utility of income. If there is some aversion to inequality, the utility of income Y(ede) is lower than the actual mean income and this provides a way to measure the social cost of inequality (see box).

Coming back to our hypothetical transfer process, we can thus compute the value of the Kolm-Atkinson index corresponding to the post-transfer income distribution and compare it with the value of the same index associated with the initial (pre-transfer) distribution. Since inequality has been reduced, the post-transfer value of the index is lower than the pre-transfer one and the difference gives what we might call a "social gain". This result is expressed as a percentage of total income and can thus directly be compared with the individual cost of the transfer for the rich – the difference between his initial income and his post-transfer income - when this cost is similarly expressed as a proportion of total income.

At each step of the transfer process, we have thus an *additional* individual cost and an *additional* social gain and both values can directly be compared. The rule that we propose is the following: so long as the additional social gain is higher than the additional individual cost, the transfer process continues. It stops just before the point at which the additional individual cost becomes higher than the additional social gain. In other words, the transfer process stops when the additional social gain is equal to the additional individual cost. At this point, we have identified a lower and an upper limit of the income distribution.

For such simulations to be empirically carried, we need to fix a value for the coefficient reflecting the aversion to inequality. This is obviously a key parameter since the value of the Kolm-Atkinson index that measures the social cost of inequality is quite sensitive to this parameter. Statistical conventions usually set this coefficient at values ranging from 0.5 to 1.5 or 2. Our objective is to go beyond such conventions, looking for an empirical estimate of inequality aversion that would be

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Throughout the paper we will refer to the Kolm-Atkinson index with this invariance property. Kolm also proposed other ("leftist" or "centrist") versions of this indicator that consider this invariance property in different ways.

the most reliable and relevant one. In fact, this is equivalent to looking for the best and most appropriate estimate of the marginal utility of income.

Box – The Kolm-Atkinson index

The Kolm-Atkinson (KA) index is one of the most popular welfare-based measure of inequality in which social welfare is represented by average utility of income. The form of the social utility function depends on a parameter, usually noted ε, which captures the aversion to inequality and allows to put different weights on each individual income. The higher the ε, the higher the aversion to inequality and the higher the sensitivity to the changes at the lower end of the distribution. As ε increases, lower incomes are given relatively more weight in producing social welfare. Consequently, the value of average utility diminishes when ε increases.

The inequality aversion parameter ε varies from 0 to infinity. When ε is equal to 0, there is no aversion to inequality: the utility of income is the same for everyone. Therefore, the higher the mean income, the higher the social welfare. When ε tends to infinity, the weight tends to be concentrated on the poorest individual.

The core concept of the Kolm-Atkinson index is the equally-distributed equivalent (EDE) income - noted here Y(ede) - , that is the level of income that would, if equally distributed to all individuals, enable the society to reach the same level of welfare as the actual income distribution. If there is some aversion to inequality (ε > 0), Y(ede) is lower than the actual mean of the income distribution: some income is "wasted in inequality".

A nice feature of the KA index is that it can be easily expressed and has a concrete meaning. If we note $\bar{Y}$ the mean of the actual income distribution and Y(ede) the equally distributed equivalent income, the value of the KA index associated with an aversion to inequality set at ε is:

$KA(\varepsilon) = 1 - \frac{Y(ede)}{\bar{Y}}$ This represents the social cost of inequality

The value of the KA index varies between 0 and 1. When there is no aversion to inequality $(\varepsilon = 0)$, Y(ede) is equal to mean income and the value of the index is 0. When $\varepsilon \to \infty$, KA(ε) tends to 1.

In the economic research, there are various areas where academics are interested in the marginal utility of income and look for some estimates. These include for instance the optimal taxation and the equal sacrifice rule, the happiness literature and the relationship between income and subjective well-being or, more generally, a lot of cost-benefit analysis.

A full review of the large body of research covering these various issues is obviously far beyond the scope of this paper and we do not pretend to have carried out such work. In their survey, Cowell and Gardiner (1999) show that there is a "considerable range of estimates for the elasticity of the marginal utility". In their conclusion, they stress the fact that, consequently, it would probably be "wise to use more than one

value". Concerning the approach we are interested in this paper, they end up with bracketing the values of 1.2-1.4[18].

We did review some of the literature published since the survey by Cowell and Gardiner. Our objective was to get the most reliable and, also, the most representative estimate, that is an estimate that could be applied to a wide range of countries.

We decided to exclude studies that are based on experiments, usually by asking questions to a small sample of students[19]. In our view, the population involved in these experiments is too specific, and too small, to provide estimates that can be considered robust.

We finally decided to choose the estimates of Layard *et al.* (2008). The main reason is that this study is, to the best of our knowledge, the most comprehensive one. It combines the results of six different surveys and the data cover over 50 countries and time periods between 1972 and 2005. Results appear to be very consistent, both across countries and across different groups of the population. The central estimate of the study for the marginal utility of income is 1.26, with a 95% confidence interval of 1.16-1.37[20]. These are the values that we have used in our calculations. These values are very close to the ones suggested by Cowell and Gardiner. They are also very close to the estimates of another study based on the structure of personal income tax rates of 20 OECD countries and that suggests a value close to 1.4 (Evans, 2005).

4. The rationale: disagreement and compromise

The rule that we propose may seem arbitrary. In this section, we will show that it is not the case and that our methodology can be embedded in a coherent conceptual framework, although it is true that the properties of the Kolm-Atkinson index are used within a specific conceptual framework and a rather unusual rationale.

The Kolm-Atkinson index provides a measure of the social cost of inequality. This social cost captures and summarizes what we might call the 'point of view of the society' on inequality. Since the society is committed to the improvement of social welfare, it may want to decrease this social cost to reach this goal. And this could

[18] It is also worth noting that, for income tax alone, the end estimates of Cowell and Gardiner are much lower than that of Stern (1977) for the end of the 1970s.
[19] See for instance *Amiel et al.* (1998), Beckman *et al.* (2006).
[20] Estimations made on a French database end up with a similar, but slightly higher value (Houdré *et al.*, 2014).

motivate some transfer from the richest to the poorest in a way that we proposed in our methodology[21].

Throughout the whole transfer process, we assume that this point of view is the most legitimate one and that no individual could outweigh, so to say, the voice of the society concerning the valuation of this social cost. We take this value as a benchmark to estimate the social gains at each step of the transfer process and we compare these estimates with the income surplus of the richest individuals involved, at each time, in the transfer process.

We thus move from the interpersonal comparison which is familiar to economists to a comparison between the point of view of the society and the point of view of a specific group of the population that we may name as 'rich'. This comparison, we think, is quite close to what most people have in mind when they criticize the excessive incomes of richest individuals and, more precisely, the fact that such excessive incomes may hurt in some way the society.

We have now to consider the point of view of the richest individuals. We may imagine that some of them would not share the view of the society, probably because any transfer would decrease their own personal welfare. These people may thus express some disagreement. For instance, the richest individuals may claim that the personal utility that they derive from their income is greater than its social utility as it is valued by the society. In other words, they may be less averse to inequality. The rationale behind our methodology allows to cope with this disagreement. It considers that, *concerning the income surplus involved in the transfer process*, the claim of the richest might be legitimate, but within certain limits that we will now precise.

When individuals oppose the view of the society concerning the aversion to inequality and the implicit related valuation of the utility of their income, this may have two distinct consequences concerning the way we balance the social gain and the individual cost in our methodology.

This claim might first invalidate the point of view of the society about the social cost of inequality. As stated above, we assume that this cannot be the case. We consider that it would not be wise to accept that the preference of a one and only individual – or of a tiny minority of individuals - could invalidate this collective point of view.

[21] A reduction in economic inequality could also be the result of economic growth if this growth were to benefit proportionally more to lowest incomes. However, the growing threat of climate change puts a limit to this strategy and, because of this limit, the society may consider that future policies to improve social welfare should be, as it has been stressed in section 1, more and more targeted to the direct reduction of inequality. With such a strategy aimed at decreasing income inequality, social welfare could be improved without putting any additional pressure on environment (the global output could remain at its actual level). The environmental constraint thus provides another argument in favour of redistributive policies.

In other words, this is not because some individuals claim that their incomes' utility is higher than what the society thinks it is, that their opinions should substitute the view of the society about the prevailing state of inequality. The members of a society are perfectly legitimate to collectively express some view about this situation and, on this question, the voice of some individuals cannot substitute the voice of the society except by the way of some dictatorial or authoritarian ruling.

The second consequence of the claim of the richest individuals relates to the way we value the individual cost that they will potentially bear in the transfer process. On this one and only point, the rationale that we propose allows the richest individuals to express their voice. And it does so in the most favourable way for the richest.

As we have seen, if the aversion to inequality is greater than zero, this means that the utility of income is greater for low incomes than for high incomes. The lowest value of the aversion to inequality is zero, meaning that, in that case, the utility of income is the same for every individual, whatever his income. When the richest individuals object the value of the aversion to inequality, they may argue that they are less averse to inequality than the society or, perhaps, that they have no aversion at all to inequality and that the society should share the same point of view concerning their income surplus involved in the transfer process.

With our rule, this is indeed what we do. We take the individual cost of the transfer at face value, with no discount for a lower utility, and directly compare it to total income. We thus consider that the utility of the income surplus of the richest is the same that the utility of income for the other members of the society. This is strictly equivalent to computing this cost in a world where there would be no aversion to inequality. In such a world, the richest individuals are put on equal footing with all the other members of the society and this, we think, cannot be said to be unfair to the richest individuals. Indeed, this is a substantial concession in favour of the richest, since the society actually considers that the social welfare derived from this income surplus is far below this "no aversion" cost[22].

In addition, we may observe that our rule assumes that *all* the richest individuals oppose the view of the society in this extreme way. This is a very strong assumption since we may think that this is not actually the case. Indeed, some American billionaires regularly claim that they should pay significantly more taxes, thus recognizing that the personal utility of their income is lower than for the other members of the society.

Of course, the richest could continue to claim that their income surplus should be valued much more. In a democratic society, the only way for an individual to oppose the view of the society would be to claim that his income surplus is of greater value

[22] Appendix A provides a simple numerical example that illustrates this rationale.

for the society than it is for himself. And, moreover, that the alleged "social gain" of this individual income would outweigh the social gain of a better, more equal income distribution. This is, in a way, the old fallacy according to which giving to the rich would benefit the poor and the society more generally[23]. We will not discuss here the shortfalls of what is, in our view, an ideology. However, we must admit that this idea is strongly resilient in the political discourse[24].

At this point, we can summarize the rationale as follows. At the starting point, we have explicitly introduced in our conceptual framework what we have called for commodity reasons 'the society' and we have given this social actor some power to argue with individuals[25]. We have acknowledged the fact that there could be some conflict between the society's interest and the interest of the richest individuals. Faced with this difficulty, we have proposed a compromise that could offer a reasonable solution to this conflict and we have, finally, demonstrated that this compromise cannot be said to be unfair to the richest individuals and is, on the contrary, the most favourable one for these richest persons. This provides thus a limit to the claims of the richest and allows us to explore the concrete measure of this limit.

In a peaceful and truly democratic society, we might expect everyone to accept the compromise that we propose. Opposing this compromise at a time where extreme inequalities are surging will inevitably exacerbate social conflict. This might well be the situation that we are facing now[26].

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[23] In the parodic novel on human societies written in 1908 by Anatole France (*L'île aux pingouins*), one of the rich penguins argues that rich should not be taxed since "the poor live on the good of the rich" (*Les pauvres vivent du bien des riches*), and that, therefore, "their good is sacred".

[24] The new elected French president Emmanuel Macron decided to abolish the wealth tax concerning financial assets. The main argument was that it would benefit the French economy since this money would be invested and thus would create more richness (allegedly for all…). However, the French president was forced to acknowledged that there was no guarantee that this would be the case. The argument is very close to the one made by the German Chancellor Helmut Schmidt in 1974 (the so-called "Schmidt's theorem") according to which "today's profits make tomorrow investments and the jobs of after tomorrow". The argument proved to be totally wrong

[25] In this way, we try to answer the sharp criticism raised by Trygve Haavelmo (1989) in his "Nobel" lecture, that economic theory is "starting at the wrong end" since it considers, in short, individuals in isolation from the society. With the rationale that we propose, we are of course far from building any theory and we do not have that pretention at all. The rationale simply shows that considering explicitly a point of view (or a 'preference') that goes beyond purely individual preferences may help tackle some issues in a different and, hopefully, meaningful way. There are few doubts that the issue of economic inequality offers a very good case for exploring such rationales.

[26] This statement refers to Karl Polanyi's analysis in his magnum opus *The Great Transformation* (1944) and his concept of "double movement". Polanyi considers that markets are embedded in a complex web of social, cultural and historical realities (the "society") and that, therefore, the movement towards "free markets" is a pure utopia that is doomed to fail and that leads to chaos.

5. Empirical estimates of inequality limits in the EU countries

To empirically estimate lower and upper limits to inequality, we must first precise which inequality we are talking about. In the previous sections, we referred to the objective of need satisfaction and we have argued that, at the end, this is the most appropriate concept that relates to human well-being. The concept of equivalent disposable income provides the most relevant proxy for measuring this objective. The equivalent disposable income is the total after transfers (whether negative or positive) income of a household, divided by the number of so-called "equivalent adults", in order to take into account the composition of the household and the age of its members. The process of converting total income into equivalised income is the usual way economists take into account the economies of scale and also the potential variations in needs across household's members.

Our data come from the Eurostat database that gives some details upon the income distribution, with all quartiles and deciles plus the five upper and lower centiles. Since the simulation proceeds step by step, it is important to simulate the effects of the transfer process with a rather detailed distribution of incomes. Quintiles or even deciles would not allow to capture precisely the lower and upper socially acceptable limits we are looking for. That is the reason why we made some basic interpolation to get estimates for each centile. For the top centile, however, we made some specific adjustment using a Pareto imputation to further split this centile into ten classes. The final adjusted database that we have used thus provides estimates of both limits and means for each centile of the income distribution, plus a decomposition of the top centile into ten classes.

In the Eurostat database, the concept of income is the equivalent disposable income. This is *a priori* the most suitable concept four our purpose since it captures the ability of people to meet their needs. We did not make any adjustment for imputed rents although this would have been conceptually better. The main reason for this is that we still lack robust and comparable international estimates of imputed rents, especially concerning their distributional impact (Eurostat, 2013). It is not obvious that this limitation would seriously impact our results. Since the Kolm-Atkinson index is invariant if all incomes vary in the same proportion, the incidence of missing imputed rents depends on the variation, over the whole income distribution, of the relative share of imputed rents in the disposable income. In France, where the national statistical office has made real improvements in measuring these imputed rents, these variations remain small (Driant and Jacquot, 2005). Contrary to what many people might think, the share of imputed rents in the disposable income does

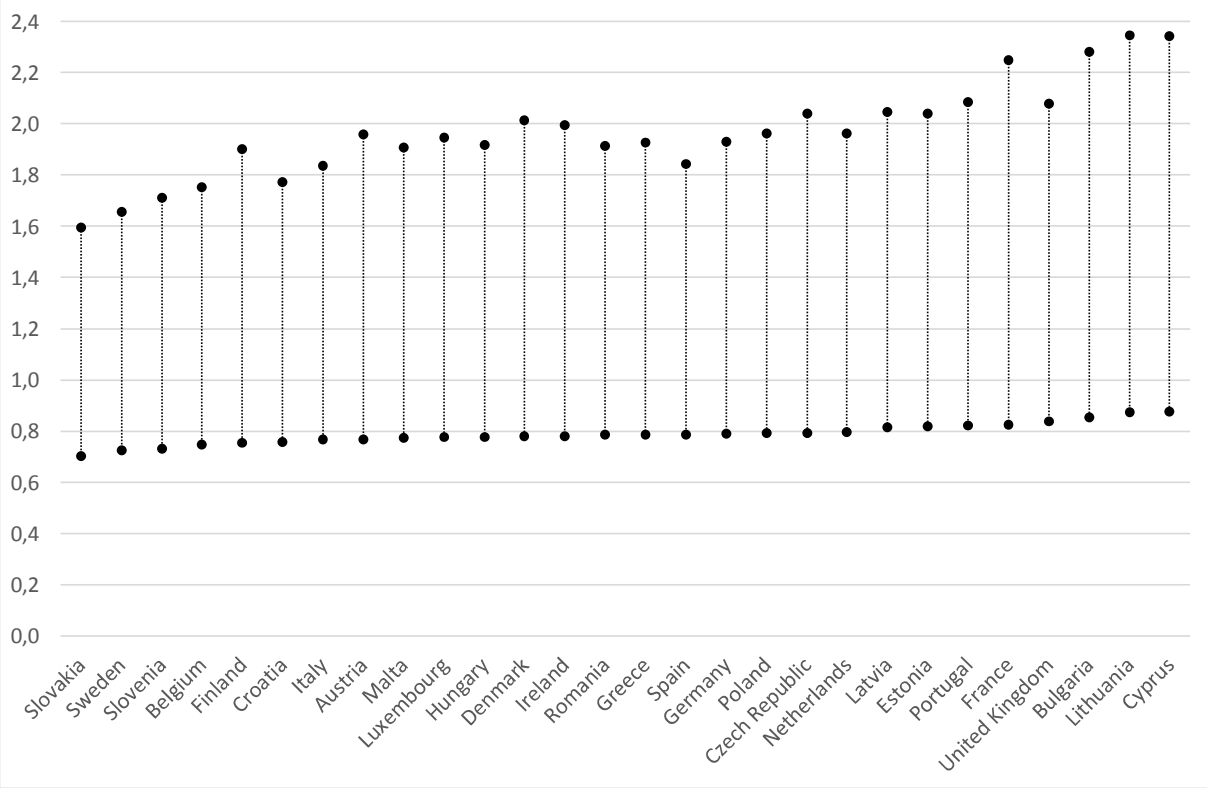
The society reacts to the unbearable pressures of this process in a counter-movement that leads to the creation of institutions, such as social security.

not vary so much from one decile to another. Hence, we may think that our results are not probably very sensitive to the inclusion of imputed rents.

Finally, we did not either made any adjustment for transfers in kind. However, we know that these transfers sometimes make a substantial part of the *adjusted* disposable income of households and that, what is more important here, their distribution may mitigate inequality of disposable monetary income (Callan *et al.*, 2008; Le Laidier, 2009).

Figure 1 presents the results of our simulations for all the EU countries. Minimum and maximum income thresholds are expressed as a multiple of median equivalent income.

Figure 1 – Minimum and maximum income thresholds
(as a multiple of median equivalent income)



Variations across countries are significant but not excessive. The minimum threshold varies between 0.70 and 0.88 (24.7%) whereas variations are greater for the maximum threshold (1.59 to 2.35). Since the upper limit tends to rise when the lower limit increases, differences across countries are the smallest for the ratio between the upper and the lower limits (2.27 to 2.73).

We have compared these results with those obtained for a few countries with the same database but using a totally different approach (Concialdi, 2018). This

alternative approach simulates the same transfer process, but it directly inputs a lower threshold based on reference budgets (RB methodology in table 2) and computes on this basis a richness line as it has been proposed by Medeiros. Table 2 shows that results are remarkably consistent, with very few differences for France and Ireland and a slightly higher gap (4%) for the UK. This is quite an interesting result since it shows, at least, that the process of building reference budgets, on the one hand, and the estimations of Layard *et al.*, on the other, are very consistent, thus legitimating both approaches and results.

Table 2
Minimum and maximum income thresholds according to two methodologies
(as a multiple of median equivalent income)

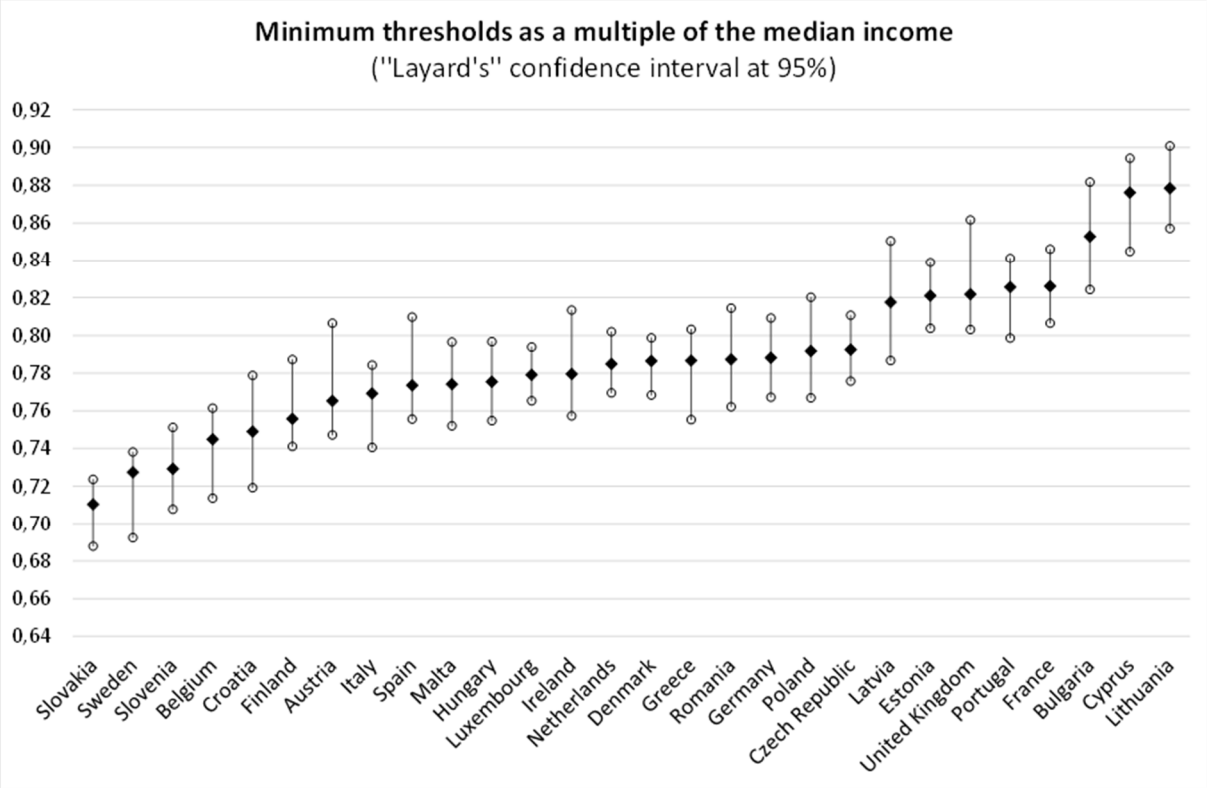
	Exploratory methodology		RB methodology	
	Minimum	Maximum	Minimum	Maximum
France	0,82	2,25	0,84	2,24
Ireland	0,78	1,99	0,78	2,01
United Kingdom	0,84	2,08	0,87	1,99

Source: Concialdi (2018) for the reference budgets' methodology, this paper for the exploratory methodology.

One of the limitation of household surveys is that they do not well capture incomes at the very top of the income distribution. An important question is therefore whether our estimates would be sensitive to these missing incomes. We did not carry out an exhaustive adjustment of all national data to test this sensitivity and this would have been probably superfluous at this exploratory stage. We just made some crude adjustments for France with assumptions that would very probably maximise the gap between adjusted and non-adjusted figures (see appendix B). With no surprise, adjusting for top missing incomes increases the inequality index sharply. The consequence is that both minimum and maximum thresholds increase in proportion of median income which remains unchanged by construction. The minimum threshold increases by around 20% whereas the increase is much more important for the maximum threshold that increases by more than 40%. Consequently, the ratio between the maximum and the minimum thresholds also increases from 2.73 to 3.19. The highest percentile is set to P96 with adjusted incomes instead of P94 with unadjusted data.

We have also test the sensitivity of our estimates to variations in the coefficient reflecting aversion to inequality, using the 95% confidence interval computed by Layard *et al.* for this parameter. Results are presented in figure 2 for the minimum threshold. With a few exceptions, variations in the value of this minimum income thresholds do not exceed 0.04 percentage points. That gives approximately the margin of error of such calculations.

Figure 2



As can be seen from the same figure, the lowest threshold is for all countries above the most usual statistical poverty line (60% of the median equivalent income). This means that setting a minimum decent income[27] at this level implicitly assumes a rather low aversion to inequality and, in any case, an aversion that is below the estimates of Layard *et al.*

Reversing the calculations, it is possible to identify (or unveil) for all the EU countries this implicit aversion to inequality, i.e. the level of the Kolm-Atkinson coefficient that would define - according to our transfer principle - a minimum income threshold

[27] A difference should be made between a poverty threshold and what can be considered as a minimum decent income. The aim of a poverty threshold is to identify a threshold below which the probability that a person would be poor (or deprived in one way or another) is high. A minimum decent income – as the one defined with the reference budgets – is a threshold above which it can be reasonably assumed that a person is not deprived and is able to participate in the society. There is inevitably a grey area between these two thresholds, especially when they are expressed in monetary terms, since one cannot consider that the situation of two persons would be significantly different with a few euros difference. Surveys carried out in France highlight this point. When people are asked below which income a person can be considered as poor, the answer is very close to the 60% poverty line. When they are asked "how much is needed to make ends meet", the answer is very close to the French reference budget which is, for a single, approximately 40% higher than the 60% poverty line.

set at the level of the usual poverty line. These calculations have been carried out for two conventional thresholds (50% and 60% of the median equivalent income).

Results show that the aversion to inequality is indeed rather low and far below the usual statistical conventions (Table 3). Among EU countries, the (not weighted) average aversion to inequality is 0.53 at the 50% threshold and 0.70 for an income threshold set at 60% of the median income.

Across EU countries, variations in the value of the aversion to inequality are significant, with minimum and maximum values ranging from 0.37 to 0.67 (50% threshold) or from 0.49 to 0.90 (60% threshold). However, there is no country where aversion to inequality would be above the coefficient identified by Layard and *al.* for such minimum income thresholds. Indeed, values are in all countries far below the estimates of these authors (1.26).

Table 3
Implicit aversion to inequality for some poverty thresholds
Distribution of EU countries

Aversion to inequality	Poverty threshold	
	50%	60%
< 0.45	1	
0.45 - 0.50	6	1
0.50 - 0.55	12	
0.55 - 0.60	5	2
0.60 - 0.65	3	3
0.65 - 0.70	1	8
0.70 - 0.75		7
0.75 - 0.80		4
> 0.80		3
Total number of countries	28	28
Minimum value	0.37	0.49
Maximum value	0.67	0.90
Average (non weighted)	0.53	0.70

Lecture: Setting a minimum decent income at 50% of the median income implicitly assumes that the inequality aversion is between 0.50 and 0.55 in 12 of the EU countries. For this 50% threshold, the average aversion for inequality is 0.53 in the EU countries.

Conclusion

The issue of extreme inequalities has attracted much interest since the turn of the century in both academic circles and the public debate. In this paper we have proposed a conceptual framework that allows to deal with this issue in a way that is, we think, close to the way this question is raised in the public debate when citizens criticize the excessive incomes of richest people. Within this conceptual framework, we have identified a potential conflict between the view of the society and the view of the richest individuals. We have proposed a compromise and argued that this

compromise cannot be said to be unfair to the richest and can thus be considered as reasonable. On this sensible basis, we have finally estimated lower and upper limits of income inequality that could be set as a policy objective within each nation.

Our results show that, in the EU countries, the upper limits range from 1.6 times to 2.4 times the median equivalent income. This result would still hold if we were accounting for missing top incomes; in that case, our estimate is that there is no EU country where the upper limit would exceed 3.5 times the median equivalent income.

Concerning the lower limits, these are in all EU countries above the usual monetary poverty lines, thus indicating that such poverty lines do reflect an aversion to inequality that may be considered rather low with regard to most robust empirical estimates of this parameter.

Finally, one interesting and quite striking result is that these lower and upper limits are very close to previous similar estimates obtained through a totally different approach making use of reference budgets that have been developed in a few countries. This encouraging result suggests that the methodology proposed in this paper might be useful to get a proxy of absolute minimum income standards that would allow people to minimally participate in the society.

The general conclusion of these empirical results is that EU countries can very probably "afford" some inequality today, but in a limited way if the objective is to provide populations with some minimum need satisfaction.

In the paper, we did not discuss any policy issue and that is obviously a serious limitation. We have constantly stressed the fact that our methodology is intended to define policy objectives and should not therefore be confused with a policy tool. We conclude with the same warning. The current state of inequality is the result of a complex variety of social and economic mechanisms and this would be totally misleading to tackle the inequality issue with a single policy tool such as, for instance, the tax system. On the contrary, this requires a set of coherent public policies and the point has been made in a clear and comprehensive way by Antony Atkinson in his last book (Atkinson, 2015). Atkinson identifies a range of core policies that should be implemented to reduce inequality and there is no doubt that his proposals provide a sound basis for the public and academic debate as well as for policy makers.

Since we have defined our methodology as exploratory, there is obviously much room for criticism and, we also hope, improvement. Moreover, we have touched upon many issues that should obviously deserve a closer attention and an in-depth discussion. In other words, our methodology is much more of a starting point to think about inequality than it gives results providing turnkey solutions. Some topics may be identified for future research.

A first direction for future research would be to improve our empirical estimates. In our view, the ones that we have proposed in this paper are still relevant for the public debate. But there is no doubt that a full discussion of these empirical questions would help better install this issue into this debate. These improvements would necessitate to better assess the impact of imputed rents and, more generally, of other non-cash income (transfers in kind) on the actual distribution of incomes to test the sensitivity of these empirical estimates to such adjustments.

A second, more conceptual, research axis would be to fully investigate other dimensions of economic inequality. Wealth inequalities are obviously a serious limitation to our approach. One empirical answer, as we have already suggested, would be to convert households' wealth into income flows as was proposed a few decades ago by Weisbrod and Hansen (1968)[28]. However, it is not clear in our view that such empirical adjustments would fully capture the key issues associated with wealth inequality. Expanding the methodology proposed in this paper to international inequalities is also clearly another necessary work if we want to seriously tackle the issue of global inequalities.

A third and very important area for future research concerns the methodology of reference budgets and the expansion of this methodology to a wide range of countries. The methodology proposed in this paper allows to identify socially acceptable limits to income inequality. However, it does not say anything about the adequacy of the minimum thresholds so defined to enable people to minimally satisfy their needs and participate in society. At the present time, the methodology of reference budgets provides most probably the best solution to this question of the socially needed minimum income. Therefore, it is important that the estimates derived from the exploratory methodology proposed in this paper could be compared with other estimates directly obtained from the RB methodology for a greater number of countries.

Finally, we would also like to stress the fact that the RB methodology may help rethinking the issue of needs' satisfaction in a more global way. In our search for limits to economic inequality, we have ended with some figures. Such figures are important, we think, to set the scene for a better, more equal future and help social actors take a clear consciousness of the excesses of our today's world. To some people, these quantitative results may seem as defining an unachievable goal or, more precisely, a goal that would so dramatically impact the standards of living of people - especially in developed countries - that it would be very hard to achieve. However, this quantitative dimension of the inequality problem should not obscure a probably

[28] The main difficulty here would probably be an empirical one because this necessitates a database that would record both incomes and wealth at the household level.

more fundamental issue which is a qualitative one. To take a clear understanding of this qualitative dimension, we must come back to the core concept of need.

In a nutshell, one could say that, in the actual mercantile capitalist world, needs have been more and more colonized by wants[29]. If the relevant end is to satisfy human needs, the question is therefore how to disentangle needs from wants. In that perspective, reference budgets can also provide a useful tool to think about this issue. The usual focus of the public debate is on the final monetary outcome of these budgets. This is not, however, the subject of discussion of the focus groups who discuss the detailed composition of goods and services that are minimally needed. During this discussion, the arguments that are put forward deliver a useful information to identify the limits between needs and wants. This qualitative information, we think, should be more systematically analysed and exploited, at both national and, possibly, international levels. Confronting the views and arguments of people across countries and cultures could help identify what we might call a common grammar of needs satisfiers across countries. And this could in turn provide some basis for recomposing consumption in both an equitable and sustainable way. Both challenges are urgent. The issue of economic inequality is no more a matter of preference or want or desire. We just need to have less of it.

[29] One can probably agree on the fact that, in the world we live today, there is a need for a mobile phone. However, it is far from obvious that we really need an ever more "performing" gadgetized (and costly) mobile phone. The question could be raised for most necessities of life.

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Appendix A

The working of the transfer process: an illustration

Let's consider a population of 20 individuals where the income of the poorest would be 1 and where income would increase gradually each time from one unit up to the richest. The income of the poorest would be 1, the next poorest would receive 2, the next poorest 3 and so on up to the richest who would receive 20. Total income would be 210 and the mean income would be 10.5 (210/20).

Let's further suppose that the aversion to inequality would be 1.26, thus reflecting the point of view of the society about the utility that each individual derives from his income. In this situation the equally distributed equivalent income Y(ede) would be 7.6 and the value of the Kolm-Atkinson index 0.2757. This would reflect the point of view of the society about the social cost of inequality that would be, in that case, equal to 27.57% of total income. This is the pre-transfer situation. The following table presents the point of view of the richest individual although at this stage he has no voice. These figures are mentioned since they are needed to compute the cost of transition from the point of view of the richest.

	Point of view of the society	Point of view of the richest individual
Pre-transfer situation		
Aversion to inequality (ε)	1.26	*0* *(no aversion to inequality)*
Mean income	10.5	*10.5*
Y(ede)	7.60	*10.5*
(1) KA (ε)	0.2757	*0*
Transition: one unit of income is taken from the richest and not yet transferred to anybody		
Mean income	10.5	10.5
Y(ede)	7.59	10.45
(2) KA (ε)	0.2771	0.00476
(3) = (2) – (1) Cost of the transition	0.00145	0.00476
Port-transfer situation Transfer of one unit of income to the poorest		
Mean income	10.5	No voice
Y(ede)	8.012	
(4) KA (ε)	0.2369	
(5) = (1) – (4) Gain from the transfer	0.0389	

In the transition, one unit of income is taken from the richest without being transferred to anybody; this would decrease social welfare. According to the society, the loss would be equal to 0,145% of total income, the difference between the initial Kolm-Atkinson index (1) and the same index in this transition (2). The richest may

challenge this view and argue that the society should not have any aversion to inequality concerning this unit of income and therefore consider that the income surplus involved in the transfer process should be valued as much as all other incomes. In that case, this transition cost would be equal to 0.476% of total income, more than three times the same estimated cost for the society.

In our methodology, we consider that the transfer may occur if this unit of income is transferred to other individuals in a way that increases social welfare more than this transition cost in a "no aversion" world. This is indeed the case if the transfer goes to the poorest individual (post-transfer situation). In that case, the social welfare gain is equal to 3.89% of total income, that is more than 8 times the cost of the transfer estimated in a "no aversion" world.

Appendix B

Adjusting for missing top incomes: a crude sensitivity test

The surge of the economic literature on top incomes since the turn of the century has quickly pushed economists to develop methodologies to better estimate these top incomes since they are massively under-reported in household surveys (Lakner & Milanovic, 2013; Anand & Segal, 2015, 2016; Jorda & Niño-Zarazúa M., 2016). We do not develop here any new methodology. We just propose a crude but quite substantial adjustment that allows us to test the sensitivity of our estimates to such adjustment for missing top incomes.

The Eurostat database is based on household surveys and gives the income shares of the top decile, with some precision within this decile. The income concept is the equivalent disposable income. We compare this shares with the ones of the World Inequality Database (WID) concerning pre-tax national income, using the concept of equal-split adult as unit of observation.

The income concept is different in the two sources. Since there is still some progressive taxation in most countries, the WID data probably overestimate the share of top incomes in terms of disposable incomes. However, the impact of shifting form pre-tax income to disposable income is not so clear since we also know that the large bulk of fiscal advantages is concentrated among top incomes. Our guess is that using pre-tax incomes of the WID database to adjust for missing top incomes in the Eurostat database probably overestimates the share of top incomes. It should also be reminded that both sources omit imputed rents.

The WID provides the income share of the top 1% and 10%. We assume that all missing incomes are concentrated among the top decile and allocate it to the top 10% and 1% using the WID data. Since the absolute value of income received by the 90% poorest individuals is assumed to remain unchanged, this allow us to compute the absolute values of incomes received by the top 1% and the remaining individuals of the top decile before and after adjustment for missing top incomes. We finally get the variations in incomes for the top 1% and P90-P99 before and after adjustment and we use the figures to adjust proportionally the initial incomes of these two groups.

Results are presented in the following table for France. The adjustment increases total income by 11.9%. Around 55% of this increase is captured by the top 1% and total income received by this top percentile more than double (+119.8%) For the top decile, the increase is 48.6%.

	Share of total income (%)		Absolute change (%)
	Eurostat	WID	
P99-P100	5,5	10,8	119,8
P90-P99	19,1	21,8	28,0
P90-P100	24,6	32,6	48,6
Total income			11,9

The Atkinson index sharply increases from .171 to .243. The upper limit increases as well, in absolute terms and in relative terms from P94 to P96. The main consequence is a sharp increase in the lower relative limit that is very close to the median after adjusting for missing top incomes (from P33 to P49). The ratio of upper limit to lower limit thus increases from 2.73 to 3.19.

	No adjustment	Adjustment
Atkinson index (%)	17.1	24.3
Upper limit		
Percentile	P94	P96
Multiple of median	2.25	3.16
Lower limit		
Percentile	P33	P49
Multiple of median	0.82	0.99
Upper limit/lower limit	2.73	3.19