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Inequality

BARBARA JANCEWICZ
University of Warsaw

People's Evaluations of Income Inequality and the Gini Coefficient: Different in Details, Similar in Patterns

Abstract: Recent studies suggest that the Gini coefficient's and people's evaluations of income inequality differ. Thus, we risk adopting policies that decrease the coefficient but not the inequality people see. This article argues that the coefficient does reflect people's perception of inequality, at least in relation to the criticised Pigou-Dalton Transfer Principle stating that inequality falls whenever a person with higher income gives a small part of it to a person with lower income. Results from a questionnaire experiment where 105 WUT students evaluated inequality of different income distributions confirm that answers strictly following the principle are rare (around 3% of the sample). However, the average correlation between respondents' and Gini's evaluations was relatively high (0.693). Furthermore, when respondents' evaluations were averaged, the correlation jumped to 0.954. An MDS analysis confirms that while these evaluations differed in details, the pattern common to respondents' evaluations was in line with the Gini coefficient.

Keywords: income inequality, inequality, transfer principle, inequality perception, multidimensional scaling.

JEL code: D63

The Gini coefficient, the most popular income inequality measure in the world arouses many controversies. Nevertheless, numerous scholars consider it the most reliable income-inequality measure. Even small changes in its levels are regarded as signals of income levelling or polarisation. Still, other scholars question not only Gini's intuitiveness but also the core rules it follows in evaluating inequality. For example, Atkinson pointed out that Gini is overly sensitive to changes in the middle of the distribution (1970) and Kolm argued that the Pigou-Dalton transfer principle, fulfilled by the Gini coefficient, goes against common sense (1999).

This critique accompanied the Gini coefficient for some time. Recently, however, a series of empirical studies undermined it further: Amiel and Cowell showed that people see changes in inequality levels differently from the rules that Gini coefficient follows (Amiel and Cowell 1992, 1999 and 2002; Amiel, Cowell and Gaertner 2012). For example, in some situations when Gini's values rose, according to many respondents income inequality fell. Since evaluating directly the Gini coefficient would be an enormously difficult task, we concentrate on a single property essential to the Gini coefficient: the Pigou-Dalton transfer principle. If people assess inequality differently than the principle, then both the principle and the Gini coefficient might reflect the economic situation, but not how citizens themselves would evaluate a country's income distribution.

This paper advocates for the Gini coefficient as a proper reflection of how non-economists evaluate income inequality, at least in relation to the Pigou-Dalton Transfer Principle. The article agrees that the work of Amiel and Cowell points towards important issues concerning the way people perceive and define income inequality, but then, extends their work with a new study and an innovative application of multidimensional scaling. The new results show that when a transfer occurs detailed respondent's answers and the Gini coefficient are at odds, nevertheless in general, they follow a common pattern. This suggests that the Gini coefficient might still be an appropriate reflection of non-economist's evaluations of income inequality.

The first section introduces the rule that the Gini coefficient follows: the Pigou-Dalton transfer principle, and discusses controversies around it. The following section reports the methodology used both by Amiel and Cowell and by the questionnaire experiment expanding it (carried out by the author). The results section depicts answers obtained both in previous experiments and in the new one. Afterwards, I introduce the multidimensional scaling technique and then analyse patterns in the data and the perception map created by multidimensional scaling. The discussion section recapitulates the main problems of the study and puts results in the context of the ongoing dialogue about the meaning of income inequality. The conclusion restates the central argument of the article through a summary of the article's key points.

A Controversial Axiom: The Pigou-Dalton Transfer Principle

Discussions about how to measure income inequality have concentrated for the most part not on the complicated mathematical formulas, but on axioms, the general rules that such a measurement should follow (Chakravarty 1999: 164). This was possible, because each measure can be defined both by a mathematical formula or by the set of rules it fulfils. Thus, by choosing several such rules (axioms) we might define an inequality measure. Conversely, when we find a rule being wrong, then we can state that measures following it reflect income inequality inadequately.

The Gini coefficient (along with other indices such as the Atkinson's and the Theil measures) follows the Pigou-Dalton transfer principle, which assumes that inequality falls whenever a progressive transfer takes place: a person with higher income gives a part of it to a person with lower income. The amount of transferred income must be small enough so that the higher income person maintains its higher income position (Coulter 1989). Surprisingly, this simple rule has far-reaching consequences.

To present an example, first, we need to introduce some framework and notation used in the studies. Amiel and Cowell's experiments described a mythical country called Alfaland, consisting of five identical regions distinguished solely by the income received by their inhabitants. Incomes assigned to region's citizens were presented in a form of a vector. A vector (10, 10, 20, 30, 30) means that two regions have incomes of 10 units, one has an income of 20, and the last two have incomes of 30.

A measure that fulfils the Pigou-Dalton transfer principle always considers the result of a progressive transfer as more equal than the original distribution. Thus (10, 10, 10, 35, 35)

is more equal than (10, 10, 10, 10, 60), because it is the result of a 25 unit transfer from the fifth to the fourth region. In case of the Gini coefficient, it means that the Gini's value for the original distribution (10, 10, 10, 10, 60) is higher than for the distribution after the transfer (10, 10, 10, 35, 35).

However, Kolm (1999: 21) argues that transfers do not always diminish inequality. For example turning a (10, 10, 20, 30, 30) into a (10, 15, 20, 25, 30) by transferring 5 units from one of the richest to one of the poorest regions can be said to reduce inequality. However, it also destroys equalities between two poorest and two richest regions. Thus, Kolm encourages reconsidering whether the transfer principle reflects what income inequality means.

Measuring People's Perception of Inequality

This study investigates whether the Pigou-Dalton transfer principle reflects people's evaluations of income inequality, assuming they know the shape of the income distribution. This is not a small assumption to make since numerous studies (e.g. Cruces et al. 2013, Hauser and Norton 2017) have shown that people have little information about income distribution and inequality in their country. Here, we look only at a particular situation in which people get the complete information about the income distribution in question. Still, the task of uncovering how people make evaluations in these specific conditions is extremely difficult.

Amiel and Cowell (1992, 2002) approached the problem by asking respondents first to compare income distributions in pairs, and then to state whether they agree with a general principle. Their other study, conducted in collaboration with Gaertner (Amiel, Cowell and Gaertner 2012), concentrated on the transfer principle as the most controversial property. Their convenience sample consisted of university students that had at least basic arithmetical skills. Amiel, Cowell and Gaertner also made sure that respondents hadn't taken any income inequality measurement classes. The pen-and-paper survey was conducted during class time and supervised by one of the researchers.

The study presented in this article was conducted between May and June 2014 on a sample consisting of 105 students of Warsaw University of Technology, thanks to the courtesy of the University's lecturers and professors. The methodology mimicked the one used by Amiel, Cowell and Gaertner's (2012): the sample was a convenience one; respondents were students of the Warsaw University of Technology with at least basic arithmetical skills; respondents were recruited in groups that took no income inequality measurement class; the pen-and-paper survey was conducted in the class during class time; and it was supervised by the researcher.

There was only one, albeit significant, difference in the survey: instead of asking respondents to compare pairs of income distributions I asked them to compare and place all of the considered income distributions on a 0 to 10 scale (the questionnaire itself can be found in the appendix). This change allowed for a previously unavailable advanced pattern analysis.

Results

The Pigou-Dalton transfer principle, the cornerstone of many income inequality measures, was chosen by the respondents as the preferred rule rarely. To be more precise, respondents were told that a small income transfer from a "rich" to a "poor" region in a mythical country of Alfaland took place. Then they were presented with a set of views and asked to choose the one (or two, or three, or more) that is closest to their own view. One of these views expressed the Pigou-Dalton transfer principle: "Inequality in Alfaland must fall, even if there is a change in the income ranking of the regions as a result of this transfer, and even if the transfer is not from the richest region to the poorest." Table 1 presents how respondents answered this question. In every other study mentioned in this article, less than one in four respondents chose the discussed Pigou-Dalton transfer principle, and in the current study, less than one in five respondents did. Therefore, Amiel and Cowell's conclusion that the principle, and as a result the Gini coefficient, doesn't reflect respondents' views on inequality, is well founded.

Table 1

Comparison of Theoretical Views and Percentage of Supporting Answers to the Verbal Question in the Current Study and in the Previous Ones

Theoretical view / Study	Amiel, Cowell and Slottje 2004	Amiel, Cowell and Gaertner 2012	Current study
a) The Pigou-Dalton transfer principle but, the ranking of regions can't change	12.3%	7.1%	7.1%
b) Only the transfers from the richest to the poorest decrease inequality	28.0%	34.9%	33.7%
c) It is impossible to say a priori how the situation will change	15.1%	15.9%	28.6%
d) The Pigou-Dalton transfer principle	25.4%	20.6%	17.3%
e) None of the above	13.1%	—	9.2%
multiple answers: d) plus other answers	1.6%	2.4%	3.1%
multiple answers: other combinations	2.9%	—	1.0%
SUM	98.4%	—	100.0%

Source: Amiel, Cowell and Slottje (2004); Amiel, Cowell and Gaertner (2012); own research.

Similarly, when respondents evaluated income distributions on the 0 to 10 scale, their choices rarely conformed with the Pigou-Dalton transfer principle. For comparison's sake, let us start by looking at selected pairs of examples, since in the previous studies respondents only compared income distributions in pairs and chose which one of the pair was more unequal, if any. If the differences between the income distributions in the pair can be depicted as a progressive transfer, then respondent's answer can be interpreted as in line or not in line with the principle: it is in line with the Pigou-Dalton transfer principle when the respondent chooses the original distribution (before the transfer) as more unequal. However, table 2 shows that even when the region with the highest income transferred some of

Table 2

Percentage of Answers in Line With the Pigou-Dalton Transfer Principle to Numerical Questions (pairwise comparison of income distributions) in the Current Study and in the Previous Ones

Compared distributions:		Amiel, Cowell and Slottje 2004	Amiel, Cowell and Gaertner 2012[a]	Current study[b]
A	B			
2, 5, 9, 20, 30	3, 5, 9, 20, 29	54.0%	70.9%	80.0%
2, 5, 9, 20, 30	2, 6, 9, 20, 29	47.0%	59.0%	73.3%
2, 5, 9, 20, 30	2, 6, 9, 19, 30	—	44.0%	60.0%
2, 5, 9, 20, 30	2, 6, 8, 20, 30	33.9%	35.8%	61.9%
2, 5, 9, 20, 30	2, 10, 9, 15, 30	45.4%	56.7%	64.8%
10, 10, 10, 10, 30	10, 10, 10, 20, 20	54.4%	74.6%	75.2%
Answers in line with the Pigou-Dalton transfer principle in all cases:		9.8%	13.4%	33.3%

Source: Jancewicz 2016a; Amiel, Cowell and Gaertner 2012.

Note 1: the order of presentation is different than the one used in the questionnaires.
Note 2: no bolding was used in the questionnaires. Here it shows which regions took part in the transfer.

[a] Amiel, Cowell and Gaertner's results differ slightly between the 2007 working paper and the 2012 article. However, the differences are minor (2,2 percentage points at most) and insignificant.

[b] In this research respondents instead of comparing selected pairs were asked to place examples on a 0 to 10 scale.

it to the region with the lowest income, more than one in five respondents indicated that it either didn't matter or that this transfer increased income inequality.

Respondents who chose an answer in line with the Pigou-Dalton transfer principle (and the Gini coefficient) in every pair analysed by previous studies were rare. Here, however, we can see the biggest difference between the studies. While in previous studies at most one in seven respondents compared all analysed pairs in line with the transfer principle, in the current study it was much more: one in three respondents. Most likely, looking at the distributions together and placing them all on a single scale encouraged consistency.

This result is only partial. Respondents in the current study evaluated all of the distributions on a 0 to 10 scale, so we can analyse their answers from different perspectives for example by comparing evaluations of two selected income distributions or comparing rankings/order of all income distributions. The Pigou-Dalton transfer principle states that if one distribution can be created from another by a progressive transfer, then this new distribution is more equal. If two distributions cannot be interpreted in such a way, then the transfer principle states nothing about them. For example, it does not specify whether (10, 10, 10, 20, 20) is more or less equal than (2, 5, 9, 20, 30), but it does say that (10, 10, 10, 20, 20) is more equal than (10, 10, 10, 10, 30). Therefore, in the case of our set of income distributions, multiple orderings are in line, or rather not against, the Pigou-Dalton transfer principle. This means that it was possible for the whole sample to rank income distributions in line with the principle (this would be a 100% of agreement with the principle), but still slightly differ in answers. So, did respondents create orderings in line with the Pigou-Dal-

ton transfer principle? Not really. Only 5,7% of the sample ranked income distributions in such a way, suggesting that only a minority of people think of income inequality exactly as the Pigou-Dalton transfer principle.

Nevertheless, expecting such precision from peoples' answers in following a principle, is unreasonable. Every study result has a certain component of error that interferes with the underlying pattern. In case of studies on income inequality perception, this component might be quite large since for many people this is a difficult topic. Aggregation of answers should allow the influence of such random errors to even-out.

We can see this evening-out in the current study. The similarity between respondents' evaluations and the Gini coefficient (following the Pigou-Dalton transfer principle) can be measured by a standard correlation. The Gini coefficient evaluates each income distribution on a 0 to 1 scale, while respondents evaluated income distributions on a 0 to 10 scale. We can measure how similar were respondents and the Gini coefficient evaluations in two ways:

1. For each respondent, we can calculate the Pearson correlation between the individual answer and the Gini's evaluation and then average those correlations. This gives the average correlation of 0.693.
2. We can average evaluations of all respondents, giving each income distribution a single mean evaluation. Then we can calculate the Pearson correlation between these mean evaluations and the Gini's. This gives us the correlation of 0.954.

Thus, when the correlation is calculated for already averaged answers of all the respondent's together, it becomes very high. Averaging respondents' answers leads to an upsurge in the similarity between respondents' evaluations and the Gini coefficient. So, an evening-out occurs, suggesting that the observed differences between the Gini coefficient and individual evaluations might have been caused by random errors, while the pattern underlying respondents' answers does conform to the Gini's coefficient's.

Table 3

Gini's and Averaged Respondents' Evaluations of Studied Income Distributions

Income distribution example	Gini's evaluation	Average evaluation by respondents
2, 5, 9, 20, 30	0.430	7.73
2, 6, 8, 20, 30	0.424	6.78
2, 6, 9, 19, 30	0.418	5.88
2, 6, 9, 20, 29	0.412	6.07
3, 5, 9, 20, 29	0.406	5.15
2, 10, 9, 15, 30	0.376	6.66
10, 10, 10, 10, 30	0.229	1.83
10, 10, 10, 20, 20	0.171	0.67

Source: own research.

The Multidimensional Scaling technique

We need to be sure, however, that this upsurge is not an artificial result. Therefore, we want to check what aspects of respondents' answers were lost in the averaging out. We cannot do that with multivariate regression, since the large amount of potential explana-

tory variables (e.g. the first region's income, the percentage of income going to the first region, the difference in incomes of the first and last region, the income inequality according to the Gini coefficient, the Atkinson measure, the Theil measures, …) and the following high multicollinearity makes it unreliable. Instead this article tries to reconstruct the way respondents perceived income distributions studied, using multidimensional scaling. Multidimensional scaling was first developed in psychometrics and one of its purposes is to "discover the dimensions that underlie judgments of (dis)similarity" (Borg and Groenen 2005: 3) which is exactly the aim of this study. Alternatively, this technique can be interpreted as a visualisation method that allows researchers see the shape of their data, enabling better interpretation.

Multidimensional scaling takes individual respondent's placement of the income distributions on a 0 to 10 scale (this is where evaluations of differences between distributions are taken from) and tries to create a common map that reflects—as closely as possible—those evaluations[1]. Each respondent's view is reflected as his/her individual one-dimensional map, this individual map is created by weighting the common map's dimensions. Each one-dimensional map is compared to respondent's original answer: multidimensional scaling aims to minimize the differences between them in a classical least squares fashion. While each respondent's map has only one dimension, often, the common map needs several dimensions because different respondents seem to pay attention to different aspects of income distributions and we wish to reflect that. In case of this study, the easiest to read two-dimensional solution proved to be insufficient and the use of three dimensions turned out to be the most appropriate[2]. This is in line with Kolm's (1999) and Amarataya Sen's (1973) points that income inequality is a complex and multifaceted concept.

Dimension weights represent each respondent's own unique way of looking at the common perception map. A weight of 0 means that a respondent didn't seem to consider this dimension at all. A weight above 0 means that the respondent seemed to include this dimension in the way shown on the common map. A weight below 0 means that this dimension was included but in exactly the opposite way than the map shows.

The common map shows whether income distributions were perceived as similar or dissimilar in terms of income inequality. Two points (income distribution examples) are close to each other on the perception map if they were often ranked closely together by the respondents. Conversely, two points are placed far away from each other if they were often ranked distantly by the respondents. In general, the perception map allows us to see the dimensions that seemed important to respondents and where the chosen income distributions are located on such a map.

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[1] The reduced-rank MDS technique was used. It is described in detail in Borg and Groenen 2005. The analysis was conducted with PROXSCAL algorithm (available in SPSS 22). Each respondent was given the same weight and answers were considered to be measures on an interval scale that was scaled simultaneously for all respondents (no individual rescaling). In order to find the best map, I tested over 10 000 different starting configurations, since the obtained result might have depended on the algorithm's starting point.

[2] Perception maps of 1, 2, 3 and 4 dimensions were tested against random data of identical structure. The 2-dimensional solution proved to be unstable with one strong dimension always shown but two other dimensions competing for inclusion in the final solution. Therefore, inclusion of all three of these dimensions proved necessary leading to the 3-dimensional map that reflected the data best.

The Perception Map of Respondents' Answers

Multidimensional scaling helps us see what parts of respondents' evaluations were in line and which were at odds with the Gini coefficient. Figure 1 shows the common perception map. The map is three-dimensional because that best reflects differences in respondents' answers. The first dimension (X) roughly corresponds to the Gini coefficient. Maps resulting from Multidimensional scaling can be rotated freely since the distances between objects are the core result. Thus, the map presented in figure 1 was rotated to make the relation between the income distributions and the Gini coefficient visible. The other two dimensions correspond to other aspects of respondents' evaluations and, unlike the first dimension, they mostly evened out in the averaging.

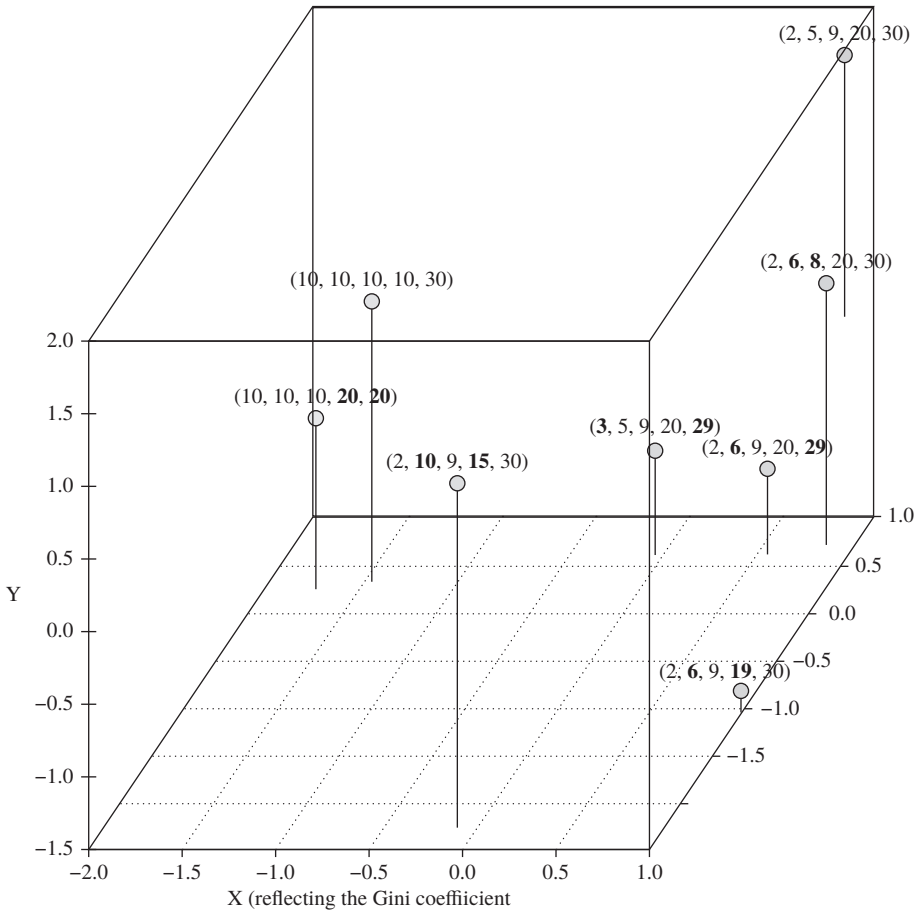
The second dimension (Y) highlights differences, that are not in line with the Gini coefficient and occur between all the income distributions created from (2, 5, 9, 20, 30) by a single transfer. These differences were included in many respondent's evaluations, but with high variation resulting in both positive and negative weights. It shows, that there was no consensus on how these differences influence income inequality. This suggests either differing views or random errors. The average weight of this dimension is close to zero (and equals 0.0608), so an evening-out effect occurred.

The third dimension (Z) focuses on the difference between the basic income distribution (2, 5, 9, 20, 30) and its modified version: (2, 10, 9, 15, 30). The basic distribution hides in the back, while the modified one stands in the front of the perception map. The modified income distribution stands out from others because it results from a transfer of five units, while other income distributions result from transfers of only one unit. In-between the basic and the modified income distributions stands an income distribution created, as others, by a one-unit transfer, but concerning, as the modified income distribution, the fourth and second region: (2, 6, 9, 19, 30). It seems, that those respondents who evaluated (2, 10, 9, 15, 30) differently from other income distributions also noticed that (2, 6, 9, 19, 30) is a result of a similar, but smaller transfer. Overall, the third dimension shows that respondents noticed an irregularity in income distributions and it influenced their evaluations. However, some respondents considered this atypical income distribution less equal (a negative weight), while others considered it more equal (a positive weight). Again, this suggests either large differences in views or random errors in evaluations. As a result, the averaged influence (weight) of this dimension was only −0.0265, so differences in evaluations of this aspect almost completely cancel each other out.

In contrast, the first dimension that corresponds to evaluations in line with the Gini coefficient, has small variability with only positive weights and an average of 0.533, which is high in case of this perception map. However, it is important to point out that a part of this consistency can be caused by a large difference between evaluations of two groups of income distributions. The first one, often evaluated as low-inequality, consists of (10, 10, 10, 10, 30) and (10, 10, 10, 20, 20); the second one, often evaluated as high-inequality, consists of all the income distributions created from (2, 5, 9, 20, 30) by a single transfer. The Gini coefficient and many other income inequality measures agree with those evaluations. Nevertheless, it seems that this dimension was the only one on which all of the respondents agreed. Therefore, after respondents' answers were av-

Figure 1

Perception Map Representing Respondents' Answers



Source: own research.

Note: configuration of income distributions in 3D space created with multidimensional scaling used on respondents' answers.

eraged, it was the pattern that remained and it is in line with the Gini coefficient (Table 3).

Overall, the study shows that respondents evaluated income inequality differently than the Pigou-Dalton transfer principle does, which confirms what previous studies have found. However, respondents' individual evaluations differ not only from the principle but also from each other and when responses are looked at collectively, a common pattern emerges, a pattern in line with the Gini coefficient.

Table 4

Perception Map Coordinates of Income Distributions Examples

Income distribution example	Perception map coordinates		
	X	Y	Z
2, 5, 9, 20, 30	0.9374	1.8564	0.7326
2, 6, 8, 20, 30	0.8489	0.3071	0.6973
2, 6, 9, 19, 30	0.9807	−1.3964	−0.9867
2, 6, 9, 20, 29	0.5644	−0.9232	0.6222
3, 5, 9, 20, 29	−0.0339	−0.7927	0.6188
2, 10, 9, 15, 30	−0.113	0.8594	−2.2518
10, 10, 10, 10, 30	−1.4575	0.4233	0.3141
10, 10, 10, 20, 20	−1.7269	−0.3339	0.2536

Source: own research.

Table 5

Descriptive Statistics of Respondent's Dimension Weights. Dimension weights reflect how respondents look at the common perception map

Dimension / Respondents' weights statistics	Minimum	Maximum	Average	Standard Deviation
X	.1997	.6924	.5327	.0880
Y	−.6024	.3985	.0608	.1951
Z	−.4482	.4670	−.0265	.2220

Source: own research.

Discussion

The presented study is one out of many conducted on how people perceive income inequality. Most of them followed the standard created by Amiel and Cowell (1992) and yielded similar results (a broader comparison of results obtained in other studies can be found in Jancewicz 2016a). In specific questions, respondents did not evaluate inequality as an income inequality measure would. Also, individual respondent's answers were very often in conflict with themselves. For example, in results of Amiel and Cowell's first study (1992) answers to three interlinked questions sometimes formed an unresolvable conflict (e.g. $A < B$, $B < C$ but $A > C$), pointing to a lack of opinion or an error. Therefore, researchers did treat them as errors and concentrated on other aspects of respondents' answers. Another conflict emerges when those who agreed with the transfer principle when it was stated verbally, often did not follow it when evaluating income distributions (Jancewicz 2016b). Possibly, for this reason, Amiel and Cowell decided not to compare answers to those two types of questions. Researchers of income inequality perception seem to expect such errors and try to minimize their influence often by simply excluding or ignoring in their analysis.

The methodology used in the original questionnaire (Amiel, Cowell and Gaertner 2012) made it difficult to look at patterns in respondents' answers. The placement of all the income distributions together on a single scale is a new element of this study. It expands possibilities for result analysis since we obtain the ranking of all income distributions stud-

ied and distances between them. However, it also changes the way that respondents might approach income distribution's evaluation. It could coerce respondents towards considering the whole set of income distributions and thinking about the way they would evaluate them before answering. However, the results on pairs of income distributions seem similar to those obtained in other studies. Only when all the examples are considered together this study shows higher consistency. In conclusion, it seems that the methodology change had a small impact on detailed results but a large one on analysis possibilities.

Unfortunately, there is a problem with making comparisons between studies on income inequality perception and evaluation, since all the samples were non-random and often consisting solely of university students. Amiel (1999) argues that this is the best way to elicit people's views on income inequality. Still, non-random sampling forces scholars to draw links between studies by relying on similarity in results. In case of this study, it is the similarity in answers to the verbal question and comparisons of income distribution pairs. Using a random sample, or an experiment (similar to one conducted by Gaertner and Namazie (2003)) with respondents answering different questionnaire versions would strengthen the article's claim. Nevertheless, the methodology and analysis used here are innovations in this field that can be easily applied in further studies.

Studies in income inequality perceptions struggle with the proper choice of income distribution since we cannot expect people to thoughtfully evaluate more than only few distributions. This study used Amiel, Cowell and Gaertner's (2012) distributions and differences between some of the pairs are relatively small: a transfer of one income unit. This approach is typical for studies on welfare or income inequality perception (e.g. Ballano and Ruiz-Castillo 1993; Traub, Seidl and Schmidt 2009; Amiel and Cowell 1992, 1999, 2002). One could argue that such small differences between income distributions might be hard to notice, but these are exactly the examples that most resemble real life changes in income inequality. Examples of larger transfers would be easier to notice, but they would also look more improbable and abstract. Therefore, even while we can suspect that comparing similar income distributions required more effort from respondents, their answers do make sense suggesting that in large part they succeeded in noticing and evaluating those differences. Nevertheless, extrapolating a general attitude towards income inequality from an evaluation only of eight income distributions is a difficult task. This makes comparisons with other studies even more important both at the stage of result analysis and at the stage of research planning. With each new study, we can improve our choice of income distributions and extend our knowledge about how people evaluate income inequality.

The income distribution set chosen for this study follows income distributions used in the Amiel, Cowell and Gaertner's study which concentrated on the Pigou-Dalton transfer principle (2012). It has the advantage of focusing on one problem at a time, but it also means that obtained results touch only this one aspect of income inequality measurement. There are many income inequality measures that, like the Gini coefficient, fulfil the principle e.g. the general entropy measures (the Theil measure among them) and Atkinson measure. The obtained results can be applied to all of them since their evaluation of the studied income distributions is similar. The Gini coefficient was chosen as the focus of this article since it is the most popular income inequality measure used.

Some experts say that it is their role to understand and interpret changes in income inequality, thus it is of small importance whether the general public evaluates income inequality in a similar fashion to the expert's measures. Aside from the philosophical argument that what constitutes the word's meaning is the way it is used and understood, we have a much more practical one: with growing access to public data, people often bypass experts and draw conclusions on their own. Furthermore, if we wanted to evaluate a particular policy's influence on income inequality, instead of decreasing the value of an abstract measure it is preferable to decrease what people actually understand as inequality.

This consideration has become even direr recently with the public discussion about income inequality revived by books by Wilkinson & Pickett (2010) and Piketty's (2014). Both positions alarmed the general public of rising income inequalities and their deteriorating influence on people's quality of life. The Polish situation is especially interesting in this respect: since 1989 the Gini coefficient in Poland has been rising rapidly, while recently it started to fall back down (Brzeziński 2013; CSO 2017). Thus, it is crucial whether these measurements actually reflect people's evaluations.

Conclusion

The Gini coefficient might be imperfect, still, it is the most commonly used income inequality measure, which makes it sometimes the most serviceable estimate of inequality available for comparisons. The empirical research on how respondents evaluate income inequality casts doubt on whether the Gini coefficient reflects how non-experts understand income inequality. Amiel, Cowell together with Slottje (2004) and Gaertner (2012) concentrated on the Pigou-Dalton transfer principle and showed that their respondents viewed inequality differently from the coefficient.

This article argues that, contrary to results of previous studies, the Gini coefficient is an appropriate reflection of how people evaluate income inequality with respect to the Pigou-Dalton transfer principle. It presents new study and its analysis, and shows that the Gini reflects the common patterns in respondents' evaluations. The study was built on the previous ones by using the same methodology with one crucial twist: instead of comparing each income distribution pair separately, respondents compared all the examples together. It showed that while individual respondents' answers differed from the transfer principle, which is in line with the research to date, people also differed among themselves. Moreover, a common element became noticeable in their answers that was actually in line with the Pigou-Dalton transfer principle and the Gini coefficient. Suggesting, that although each person might have his or her own view on income inequality, measures can reflect the common elements of these views.

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Biographical Note: Barbara Jancewicz (Ph.D.), Researcher, Head of the Economics of Migration Research Unit, University of Warsaw. Presently, at the Migration Research Center University of Warsaw she analyzes the migration situation and intentions of Poles living in England, Germany, Ireland and the Netherlands. Her main research interests include income inequality perception, survey methodology and statistical analysis.

E-mail: barbara@jancewicz.net

Inequality questionnaire

This questionnaire concerns people's attitude to inequality. We would be interested in your view, based on hypothetical situations. Because it is about attitudes there are no "right" answers. Some of the possible answers correspond to assumptions consciously made by economists: but these assumptions may not be good ones. Your responses will help to shed some light on this, and we would like to thank you for your participation. The questionnaire is anonymous (please do not sign it).

Alfaland consists of five regions that are identical in every respect other than the incomes of their inhabitants. Everyone within a given region receives the same income, but personal incomes differ from region to region.

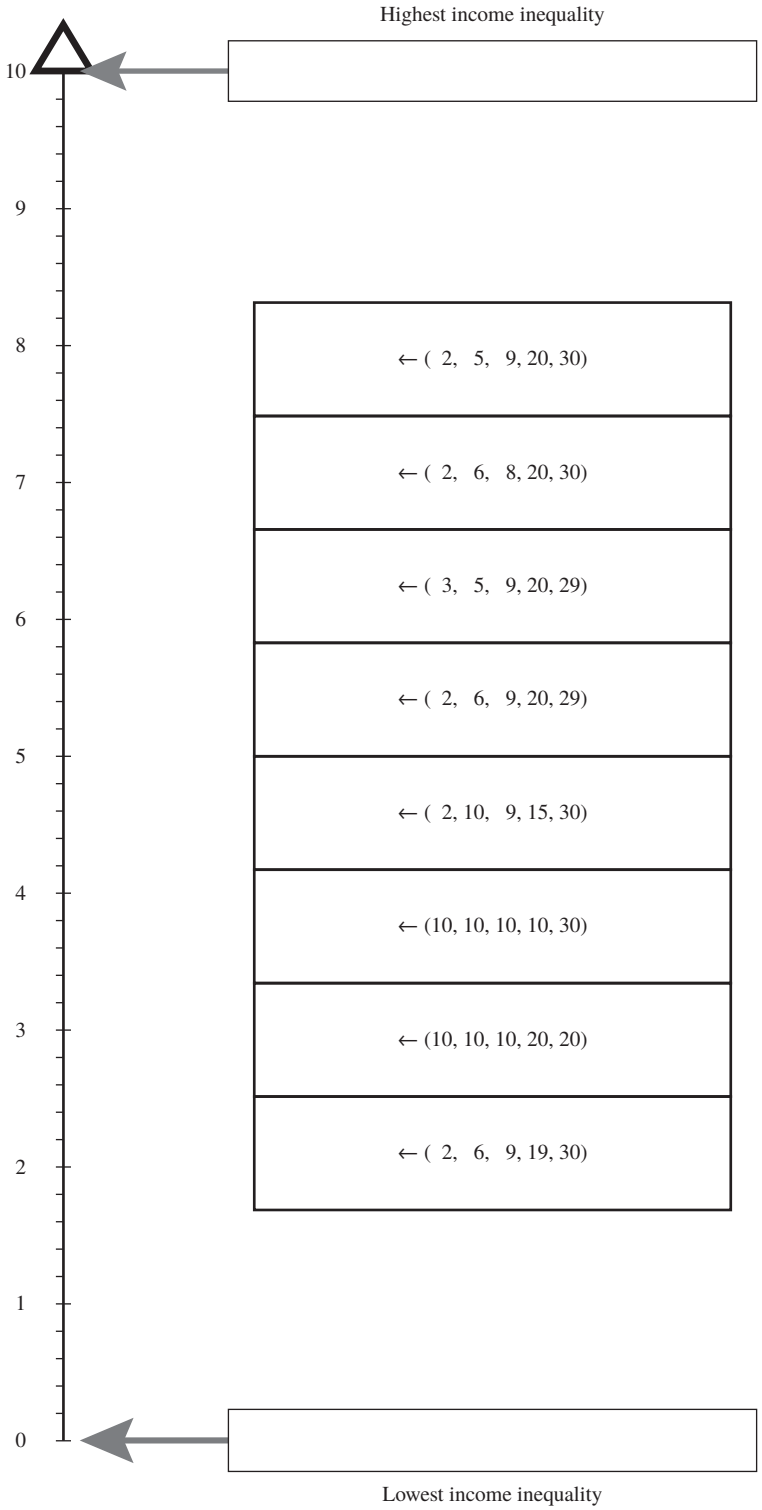
Eight economic policy proposals are being considered for implementation in Alfaland next year. It is known that—apart from their impact on personal incomes—the two policies would have the same effect on the population.

The questionnaire is accompanied by eight stickers containing alternative lists of incomes, that inhabitants of Alfaland will receive if such a policy will be introduced. For instance (2, 5, 9, 20, 30) means that in the first region everyone will have an income of 2 per month, in the second region 5 per month etc.

(1) Which income list has the highest income inequality? Please place the sticker with the corresponding income list at the top of the scale printed on the next page.

(2) Which income list has the lowest income inequality? Please place the sticker with the corresponding income list at the bottom of the scale printed on the next page.

(3) What is the level of income inequality of other income lists? Please place the remaining income lists stickers on the scale (between the lowest and highest income inequality lists) in a way best reflecting your evaluations of their income inequality level. If you consider two income lists as equally unequal, please place them on the same level next to each other.


Highest income inequality
10
9
8
7
6
5
4
3
2
1
0
← (2, 5, 9, 20, 30)
← (2, 6, 8, 20, 30)
← (3, 5, 9, 20, 29)
← (2, 6, 9, 20, 29)
← (2, 10, 9, 15, 30)
← (10, 10, 10, 10, 30)
← (10, 10, 10, 20, 20)
← (2, 6, 9, 19, 30)
Lowest income inequality

In question 4, you are confronted with a hypothetical income change and some possible views about the effects on inequality of that change. The views are labelled (a), …, (e). Please circle the letter alongside the view that corresponds most closely to your own.

You can check more than one answer, provided that you consider they do not contradict each other. Feel free to add any comment that explains the reason for your choice.

(4) Suppose income is transferred from the inhabitants of a relatively high-income region to those of a relatively low-income region, without changing the income of any other region. The transfer is not so large as to make the "rich" region "poor" and the "poor" region "rich," but it may alter their income rankings relative to the other, unaffected regions.

a) Inequality in Alfaland must fall if the ranking by income of all the regions remains the same. If there is any change in the income ranking of the regions then it is possible that the situation worsens or remains unaltered.

b) If the transfer is from the richest to the poorest region, and after the transfer, the richest region remains the richest and the poorest remains the poorest, inequality must fall. In other cases, it is impossible to say a priori how inequality will change.

c) The transfer may change the relative position of other regions. So it is impossible to say a priori how inequality will change.

d) Inequality in Alfaland must fall, even if there is a change in the income ranking of the regions as a result of this transfer, and even if the transfer is not from the richest region to the poorest.

e) None of the above.

Place for your comments:

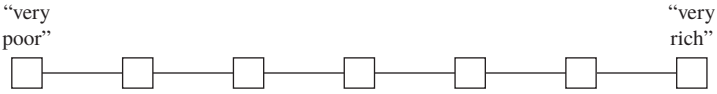
. . . . . .

. . . . . .

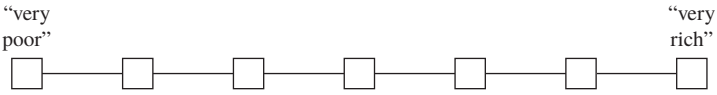
. . . . . .

Finally, we would be grateful for some information about you:

- Are you male or a female? M / F
- What is your age? . . . . . years
- Where did you live before university?
  - ☐ In Warsaw
  - ☐ Near Warsaw (up to 50 km)
  - ☐ In Poland, further than 50 km from Warsaw
  - ☐ Outside Poland
- What is your special subject of study? . . . . . .
- Were you employed before university? Yes / No
- How would you rate your family's income 10 years ago? Please put a "✓" on this scale.



- How would you rate your own income prospects 10 years from now? Please put a "✓" on this scale.



We would be grateful for any additional remarks or comments, please put them here:

. . . . . .

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. . . . . .

Thank you for your participation!