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in the Italian survey of household income and wealth

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(Occasional Papers)

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A COMPARATIVE EVALUATION OF POVERTY MEASURES IN THE ITALIAN SURVEY OF HOUSEHOLD INCOME AND WEALTH

Giovanni D'Alessio

Summary

This paper makes a comparative study of some variants of the most frequently used poverty indices, obtained by modifying the welfare indicator (income, consumption, or income/assets), the equivalence scale (OECD or square root of the number of components), the local price adjustment index and the statistic used for identifying the poverty threshold (average or median). I also look at the ISEE, an indicator used to access social benefits in Italy that has a specific combination of income and assets and its own equivalence scale. Using data from the Bank of Italy's surveys of household income and wealth (SHIW) I first analyse how the incidence of poverty varies according to different definitions; then I look at how the different variants are associated with an indicator of inability to make ends meet. The study shows a wide variety of results in terms of the poverty rate and the composition of the poor. The highest association with subjectively poor economic conditions is found for indicators combining income and wealth, while consumption provides more modest results.

Contents

* Bank of Italy, Directorate General for Economics, Statistics and Research.

1   Introduction[1]

The economic literature has produced many poverty indices over the years, modifying the various elements underlying its measurement, such as the well-being indicator, the equivalence scale, the threshold, etc. (e.g. Callan and Nolan, 1991).

With reference to the indicator of well-being, there is a strong preference for consumption, thanks to its greater intertemporal stability with respect to income, supported by the economic theory that has highlighted its links with permanent income (Deaton, 1980). Consumption is able to capture more stable elements with respect to income, which is instead more often affected by contingent factors, particularly for self-employed workers. Consumption is also preferred to income because under-reporting is usually less significant since the latter is subject to personal taxation (Meyer and Sullivan, 2003; Meyer and Sullivan 2010).

However, there are also studies that refer to income (for example, DeNavas-Walt and Proctor, 2015; Bank of Italy, 2018), based on the argument that it constitutes the set of resources from which the household can draw and not only the part that it has voluntarily directed to consumption, and because of the availability of microdata. In addition, income is definitely a more appropriate indicator than consumption for determining eligibility for social policy measures. Finally, it should be remembered that an accurate survey of income requires less complex procedures than those used for a consumption survey. In the Bank of Italy's Survey of Household Income and Wealth (SHIW), which mainly collects income data but also data on consumption, the reliability indices are higher for income than for consumption (0.89 compared with 0.82 according to Baffigi, Cannari and D'Alessio, 2016). [2]

In recent years, moreover, growing attention has been paid to the role of wealth (Caner and Wolff, 2004; Azpitarte, 2011 and 2012; Brandolini, Magri and Smeeding, 2010), the amount of which is not always associated with consumption or income levels as expected: households with low consumption (or income) and considerable wealth raise new questions about the definition of poverty. On the policy level, it is interesting to observe that the indicator employed in Italy for access to welfare benefits (the Equivalent Economic Situation Indicator or ISEE) includes both income and wealth elements.

The literature has also devoted much attention to the equivalence scales, in particular those that take into account the economies of scale that take place in larger households (see Buhman et. Al., 1988; Atkinson et al., 1995; De Vos and Zaidi, 1997). In practical applications, the most used scales are the OECD "modified" equivalence scale[3] and the one computed as the square root of the number of components. The latter is the most widely used

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[1] I thank Andrea Brandolini and Luigi Cannari for their useful suggestions. I also thank Stefano Iezzi with whom I have discussed at length a preliminary version of this work. The opinions expressed in this work do not necessarily reflect those of the Bank of Italy.

[2] Obviously, this result cannot be extended to other surveys which have different data collection procedures.

[3] The traditional (unmodified) OECD scale had a coefficient of 1 for the head of household, 0.7 for other components aged 14 and older and 0.5 for components under 14 years old. In the modified equivalence scale, the coefficient for components aged 14 and older (other than the head of household) is reduced to 0.5 and that for components under 14 years of age to 0.3.

equivalence scale among those belonging to the class of equivalence scales n^{α}, where n is the number of components of the family and α is a parameter between 0 (full economy of scale, for which the equivalent income equals family income) and 1 (no economy of scale, for which the equivalent income equals the per capita income) (Buhman et. al., 1988).

Another aspect, logically close to that of the equivalence scales but which is often treated separately, concerns the adjustment of monetary indicators (income or consumption) for spatial purchasing power parities.[4] This adoption of a spatial deflator, standard practice in international comparisons (e.g. Brandolini and Rosolia, 2019), is less common when it comes to evaluating national communities, both because of the lack of reliable spatial deflators and because it tends to underestimate the gaps in terms of quality of some goods and public services in the area, with the result of underestimating the number of poor in the most disadvantaged regions (Brandolini and Torrini, 2010, Deaton and Dupriez, 2011, Baldini et. al., 2015, Franzini et al., 2016, D'Alessio, 2017). In Italy, Istat computes absolute poverty indicators by means of an adjustment that takes into account the price levels of a basket of necessary goods by geographical area and municipality size (Istat, 2009).[5]

The topic of price gaps across Italian regions is also debated after the introduction of a subsidy provided to poor households ("reddito di cittadinanza"), which does not consider differentiated thresholds (and amounts) across geographical areas or between large and small municipalities (e.g. Hanau, 2019). It is therefore of great interest to evaluate whether poverty indicators that take into account this aspect would perform better than those that do not consider an adjustment.

This paper makes a comparative evaluation of the poverty indices by combining the criteria listed above. The experiment is carried out on SHIW data, which makes it possible to analyse all the variants described above from 2004 to 2016.

The comparison is carried out primarily to show the variety of results obtained when the considered indicator changes. This exercise is conducted with a merely descriptive spirit. The poverty threshold is set with a certain arbitrariness (Atkinson, 1987)[6] and the goal is to try to identify simply the characteristic elements of the different formulations.[7]

However, the study also evaluates the indicators that are best associated with the perception of difficulties in making ends meet, that should characterize the state of poverty. The implicit assumption in this approach is that poverty, defined on the basis of objective indicators and criteria, should be validated and calibrated in comparison with the subjective judgments gathered in the surveys (Ravallion and Lokshin, 1999; Ravallion, 2012).

Paragraph 2 provides a detailed description of the data and methods used; paragraph 3 shows the results of the comparisons while in paragraph 4 the main conclusions are reported.

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[4] Poverty thresholds are set by Istat with reference to the combination of geographical area, size of municipality of residence and type of household (Istat, 2009).

[5] Appendix A shows the table with an estimate of the price indices implicit in the poverty thresholds used by Istat.

[6] According to some authors, instead, poverty is a condition that is structurally different from that of non-poverty and the threshold is the value of the indicator variable that allows you to separate one condition from another. In this sense, see, for example, Townsend (1979) and, for Italy, Biancotti (2006).

[7] For a sensitivity analysis of the various parameters used to identify the poor, see Hagenaars, De Vos and Zaidi (1995) and De Vos and Zaidi (1997).

2   Data and methods

In this paper we will use the data from the Bank of Italy's Survey of Household Income and Wealth (SHIW), which collects data on income, consumption and wealth (Bank of Italy, 2018) and offers the possibility of comparing several estimates of relative poverty indicators.

The poverty indexes that will be analysed below are based on the following 6 well-being indicators:

a.   income - the indicator includes income from employment and self-employment, pensions and other transfers, income from real capital, including the imputed rent of buildings owned and used by the household (main residence or other buildings), and financial assets (Bank of Italy, 2018);

b.   consumption - consumption, which is collected in the SHIW with few questions, includes costs for durable and non-durable consumption; imputed rents are also included in consumption (Bank of Italy, 2018);

c.   current income (as above) augmented by the flow of income that would be obtained if the household transformed its net wealth (real estate and net financial assets) into a life annuity - the estimate of the life annuity corresponding to the net real estate and financial assets of the family (Weisbrod and Hansen, 1968) is estimated using mortality tables at the age of the reference person and with a rate of 2 per cent, having subtracted from the income the returns of the assets;

d.   income augmented by the flow of income that would be obtained if the household transformed its financial assets into a life annuity - as in the previous case but limited to financial assets;[8]

e.   income and wealth sufficient to overcome the poverty threshold for 4 years – this indicator defines as poor those households with an income below the poverty threshold, unless they have a net wealth that can sustain them above the poverty threshold for 4 years;[9]

f.   income and the stock of financial assets sufficient to overcome the poverty threshold for 3 months - this indicator defines as poor those households with an income below the poverty threshold, unless they have a net financial wealth that exceeds the poverty threshold for 3 months.

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[8] It has been hypothesized here for simplicity that people do not leave inheritance at their death and that the spouses survive for the same period of time (equal to the residual life of the head of the household).

[9] The period to be considered for this indicator and the following one is debated in the literature. Haveman and Wolff (2004) and Short and Ruggles (2005) use 3 months as the reference period, while Gornick, Sierminska and Smeeding (2009) use 6 months. In this work the limit was identified by selecting for each indicator the one that can provide the highest association with an indicator of subjective well-being. The results of this selection phase are reported in Appendix B.

The above 6 indicators are considered with 2 equivalence scales (the OECD modified and the square root of the number of members)[10] and 2 price conditions (uniform prices and differentiated prices by geographical area and size of the municipality described in Appendix A, derived from the absolute poverty thresholds reported by Istat).

To the 24 indicators, which can be calculated from 2004 to 2016, the ISEE[11] is added but limited to 2010 and 2014, because for those years only gross income data are available.[12] For comparison, a modified version of the ISEE was also considered, obtained considering a spatial deflator. Overall, there are 26 indicators whose results are examined in paragraph 3.

In paragraph 4 the indicators are evaluated comparatively in their ability to account for the bad economic conditions perceived by the subjects themselves. The assumption of such an assessment lies in the assumption that poverty is usually associated with conditions of economic distress and that these conditions are normally perceived by the subject himself. In other words, although affected by measurement errors, subjective indicators are still direct expressions of economic hardship.

The use of subjective indicators is based on the idea that the levels of satisfaction of individuals can be measured by using questionnaires (van Praag, 1968) and compared across individuals, a view that was confirmed by the work conducted by behavioral economics (Frey and Stutzer, 2002; Kahneman and Kruger, 2006; Di Tella and McCulloch, 2006) and in studies in the field of neuroscience (Ng, 1997 and 2013). [13]

Subjective economic distress, however, is not used on its own to identify poor households but only as a tool to evaluate and calibrate poverty measurement on objective grounds. In this way, the need to base the analyses on objective factors (essential when dealing with variables to be used at policy level) is connected to that of ensuring that the identified measures have a wide consensus among the population.

In the present study the poverty indexes are associated with the levels of subjective well-being collected in the SHIW through a question concerning the economic condition (Deleeck and Van den Bosch, 1992): *Is your household's income sufficient to see you through to the end of the month ...: - with great difficulty - with difficulty - with some difficulty - quite easily - easily - very easily.* This question, used in the past to estimate the

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[10] Other equivalence scales were examined in Appendix C but discarded because their adoption implies a worse capacity of the indicators to identify situations of perceived economic difficulty. The equivalence scales are also applied to the case of financial assets and wealth, since the indicators that refer to them presuppose their disinvestment for consumption purposes (Brandolini, Magri and Smeeding, 2010).

[11] The 2019 version of the ISEE, used for access to "citizenship income" (Appendix D), was considered. Since the ISEE contains some fixed-digit deductions, the data were brought back to 2019 values with the Istat monetary revaluation index in the calculations.

[12] Household data before tax are taken from the HFCS harmonized survey files. For Italy, the first wave of the HFCS reports data for 2010 and the second wave for 2014.

[13] With reference to the use of subjective well-being data in Italy, see also Biancotti and D'Alessio, 2008.

Center for Social Policy Poverty Line (CSP) (Flick and Van Praag, 1991),[14] makes it possible to evaluate the effects of monetary aggregates on well-being (Ravallion, 2012; Buttler, 2013). The above question is simpler than the Income Evaluation Question (IEQ), used to identify the Leyden Poverty Line (LPL) (Goedhart et al, 1977), which requires respondents to define the income values corresponding to each of the levels listed on a verbal scale similar to that used by the SHIW.

The comparison of the indicators is carried out on the distributions of the indicators used in the calculation of the poverty indices. Ideally, from a good indicator of poverty, one would expect the ability to concentrate all those households who declare economic hardship in the left tail. The use of distributions makes it possible to keep the share of considered households (for example 5 or 10 per cent in the left tail of the distribution) under control, evaluating the relationship with the condition of economic difficulty perceived for equal shares of households.

It should be noted that for the two indicators that use a joint criterion of low income and wealth (or financial assets) to define the poverty status, it is possible to sort the units univocally by defining a new variable that is the maximum between the equivalent income and the wealth (or financial assets) necessary to survive for the assumed time span (4 years for total wealth and 3 months for financial assets). In other words, families can be uniquely ordered to derive the cumulative distribution of the variable $Z_1 = Max (Y_{EQ}, W_{EQ} / 4)$ or $Z_2 = Max (Y_{EQ}, 4 FA_{EQ})$. The ISEE, instead, already incorporates in its formula the combination of income, assets and its specific equivalence scale (see appendix D).

3   Comparing poverty indicators in terms of population shares

Table 1 shows the poverty headcount rates obtained by means of the 48 criteria presented above from 2004 to 2016 (24 indicators by poverty thresholds defined as half of both the average and the median). Results are quite heterogeneous: the share of poor individuals varies from 3.9 per cent in 2006 for the indicator that considers consumption, the threshold equal to half the median, the equivalence scale equal to the square root of the components and the differentiated prices in Italy, up to 27.2 per cent in 2012 for the indicator that takes into account the income augmented by the life annuity of net wealth, the threshold equal to the average of the OECD equivalence scale and without any spatial deflation.

A synthetic evaluation of the effects of each of the considered factors can be obtained by a linear model, regressing the values of the shares on the dummy variables identifying the effects. The results are shown in figure 1.

According to this analysis, considering the average instead of the median to identify the poverty threshold involves an average increase in the poverty index of almost 5 percentage points, as a direct consequence of the positive asymmetry (i.e. with a tail to the

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[14] The Center for Social Policy Poverty Line (CSP) is defined as an average of the Minimum Income Requirement (MINQ) responses provided by the subset of households that define themselves as "experiencing mild economic hardship". The assumption is that families close to the poverty line are those most able to identify the value of the threshold itself. Similarly, the Subjective Poverty Line (SPL) is defined as the intersection between the curve that identifies the minimum income required and the one that describes the actual income (Flick and Van Praag, 1991).

right and an average greater than the median) of the variables being analysed. It is worth noting that in some formulations of the poverty threshold (for example in the Eurostat poverty risk indicator) the poverty threshold is set to 60 per cent of the median, and not to 50 per cent as considered here. If this threshold is used with the median, leaving 50 per cent of the one used with the average, the gap in the share of poor is reversed even if only slightly (by about one percentage point) in favour of that calculated with the use of the median (figure 1).

The equivalence scale obtained as the square root of the number of components implies a reduction of the poverty index of about 0.5 percentage points compared with the OECD scale. This is due to the fact that the square root equivalence scale assumes greater economies of scale (see figure C1 in appendix C), which tend to reduce the spread of poverty among the many families with a high number of components, mainly present in the South and Islands.

Spatial deflators reduce the relative poverty index by about 2 percentage points compared with uniform prices, due to a positive association between prices and the economic conditions of households.

A wide variety of results occurs depending on the indicator used. Compared with the income that we consider here as a benchmark, the use of consumption estimates a lower diffusion of poverty by about 6 percentage points; the income augmented by the life annuity obtainable by liquidating net wealth results in an average increase of over 4 percentage points, while the same criterion applied to financial assets only results in an increase of approximately 1 percentage point. The remaining two definitions which, compared with the condition defined on the basis of income, exclude from poverty the individuals whose net wealth (or financial assets) allows them to have resources above the poverty line for 4 years (or 3 months), result in poverty frequencies that are 4.1 and 2.7 percentage points lower than the benchmark.

In the period examined (2004-2016), the analysis identifies - on average among all the indicators considered - a rather definite trend, with a drop between 2004 and 2006 of just under a percentage point and a growth of about half a percentage point a year between 2006 and 2016 (around 4 points in the whole period).

But to what extent do the different indicators overlap in identifying poor households?

Table 2 shows the average profiles of the indicators examined for some household characteristics. We find, for example, that the share of poor people in the South and Islands is not influenced by the statistic used for identifying the threshold (average or median): the two indices are both equal to 149, while the national average is 100. Instead, the results differ depending on whether or not a spatial deflator was used (shares respectively equal to 130 and 168): the adoption of spatial deflators not only reduces the share of poor people in the whole but reduces them particularly in the South and Islands.

The adoption of spatial deflators also has an important impact on the share of poor households residing in very small and very large municipalities. In the former, rates that are substantially on average with the total (103) are significantly reduced (89) by adopting spatial deflators; in cities with more than 200,000 inhabitants the opposite occurs, with an index that goes from 102 with uniform prices to 121 with differentiated prices.

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The choice of indicator also has an impact on how the poor are distributed among the categories. The use of consumption leads to significantly higher quotas than those obtained with income of the self-employed, perhaps due to the tendency of these subjects to save to reinvest a greater part of their income in their business. Taking into account financial assets or net wealth tends to reduce the share of poor among the elderly while it increases it among young people.

The squared root equivalence scale tends to estimate a greater number of poor than the modified OECD among households with a single component (with an index of 80 compared with 61) and a smaller number among larger households (144 compared with 157).

Figure 1

Average effect of factors affecting the estimates on the poverty headcount rates, 2004-2016[*]
(percentage points – differences from the benchmark) (**)
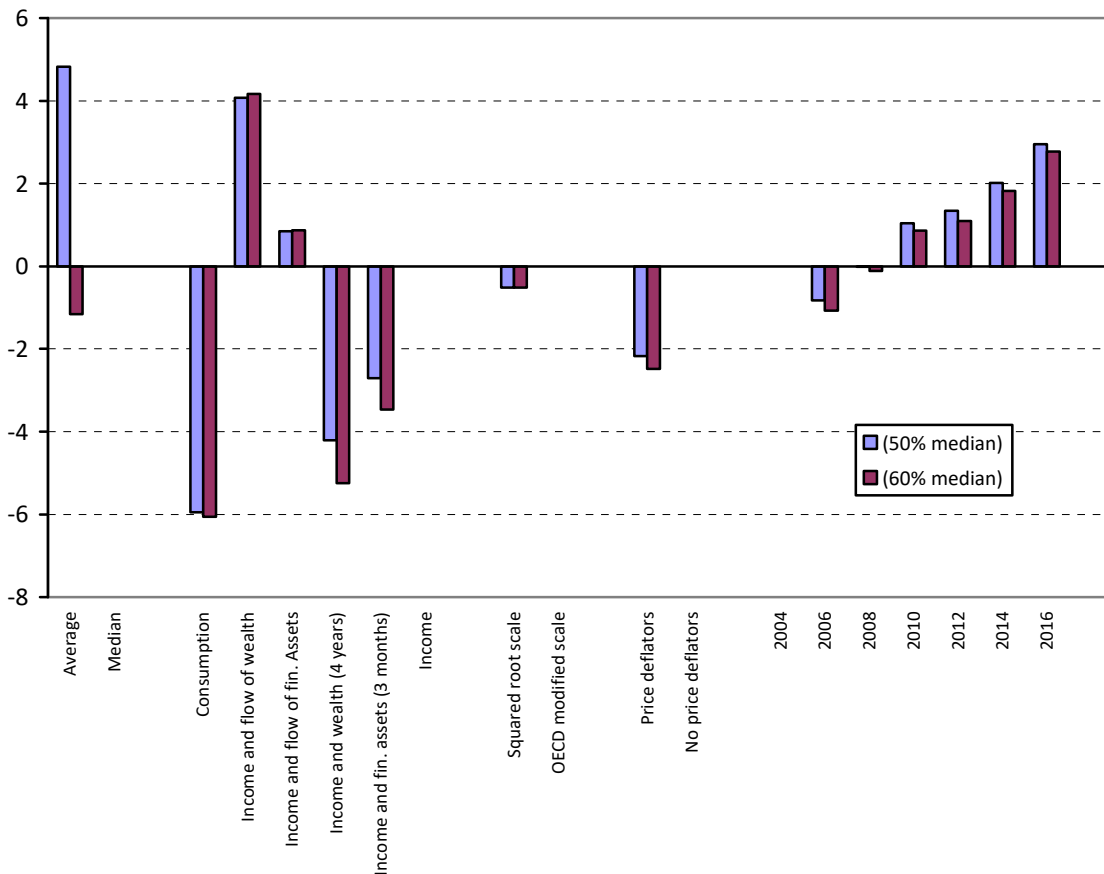
[*] Estimates obtained by means of a regression with marginal effects only – 336 observations; $R^2 = 0.940$; Intercept=13.15 (see Appendix E).
[**] Estimates obtained in 2004 on equivalent income, with the OECD modified equivalence scale, without any price deflators and threshold equal to 50 or 60 per cent of the median are used as benchmarks.

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Table 1

Poverty headcount rates according to several definitions, 2004-2016

	Average	Median	Income	Consumption	Net wealth	Financial assets	Income and wealth	Income and financial assets	OECD equivalence scale	Squared root equivalence scale	Uniform prices	Differentiated prices	2004	2006	2008	2010	2012	2014	2016
P1Me	X		X						X		X		19.0	18.1	18.3	19.3	19.2	19.2	20.5
P2Me	X			X					X		X		13.2	12.2	11.0	13.3	12.4	13.1	17.0
P3Me	X				X				X		X		23.7	23.0	24.4	25.3	27.2	25.9	26.6
P4Me	X					X			X		X		19.9	19.3	19.6	20.7	20.6	20.7	21.9
P5Me	X						X		X		X		13.7	11.7	12.7	14.2	13.4	14.1	14.5
P6Me	X							X	X		X		14.4	14.1	14.7	15.4	16.2	17.1	17.8
P7Me	X		X							X	X		19.4	17.8	18.8	18.8	18.6	18.6	20.0
P8Me	X			X						X	X		12.0	10.4	9.9	11.1	10.8	12.8	15.8
P9Me	X				X					X	X		23.1	23.1	24.1	24.6	27.1	25.2	25.7
P10Me	X					X				X	X		19.7	18.9	19.7	20.0	20.0	20.1	21.7
P11Me	X						X			X	X		13.6	11.7	13.2	13.8	13.0	13.4	14.0
P12Me	X							X		X	X		14.4	13.2	15.3	15.0	15.5	16.1	17.0
P13Me	X		X						X			X	16.1	14.4	15.3	16.0	16.9	16.8	17.8
P14Me	X			X					X			X	10.2	8.6	7.9	9.9	10.2	11.8	14.6
P15Me	X				X				X			X	19.8	19.8	20.7	22.9	24.5	23.2	23.1
P16Me	X					X			X			X	16.5	15.7	15.8	17.5	17.9	18.1	18.8
P17Me	X						X		X			X	11.8	10.0	11.1	12.3	12.3	12.7	12.8
P18Me	X							X	X			X	12.0	10.8	12.8	12.8	14.5	15.0	15.3
P19Me	X		X							X		X	15.7	14.6	15.1	16.1	15.9	16.7	17.4
P20Me	X			X						X		X	9.2	7.4	7.5	8.9	9.4	10.9	14.2
P21Me	X				X					X		X	19.7	19.6	21.3	22.0	23.8	22.5	23.1
P22Me	X					X				X		X	16.2	15.5	15.6	17.0	17.1	17.5	18.6
P23Me	X						X			X		X	11.3	9.9	11.2	12.5	11.8	12.7	12.9
P24Me	X							X		X		X	11.4	10.4	12.2	12.7	13.7	15.0	15.0
Average													15.7	14.6	15.3	16.3	16.8	17.1	18.2
Standard deviation													4.0	4.4	4.6	4.5	5.0	4.1	3.9
P1Mn		X	X						X		X		13.4	13.2	13.4	14.2	13.9	15	16.3
P2Mn		X		X					X		X		7.7	6.8	7.5	8.4	7.9	9.8	11.8
P3Mn		X			X				X		X		15.9	14.5	15.3	17.2	17.0	17.7	18.0
P4Mn		X				X			X		X		13.8	13.5	13.5	15.4	15.2	16.1	16.1
P5Mn		X					X		X		X		9.6	8.5	9.8	10.3	9.6	11.1	11.1
P6Mn		X						X	X		X		10.5	10.0	11.2	11.5	11.7	13.1	14.4
P7Mn		X	X							X	X		12.4	12.2	12.8	13.5	13.5	14.2	15.2
P8Mn		X		X						X	X		7.0	5.7	6.3	7.3	7.2	8.9	10.5
P9Mn		X			X					X	X		14.8	14.3	15.1	16.3	16.0	16.4	17.2
P10Mn		X				X				X	X		13.0	12.9	13.5	14.3	14.3	15.1	15.6
P11Mn		X					X			X	X		8.9	8.1	9.2	10.2	9.7	10.5	10.8
P12Mn		X						X		X	X		9.4	8.8	10.6	10.9	11.7	12.6	13.2
P13Mn		X	X						X			X	10.3	10.1	10.8	12.3	12.4	13.7	14.8
P14Mn		X		X					X			X	5.9	4.6	5.2	6.1	7.1	8.5	10.7
P15Mn		X			X				X			X	12.5	12.3	12.8	15.1	15.2	15.8	16.1
P16Mn		X				X			X			X	10.6	10.5	11.3	13.0	13.6	14.4	15.0
P17Mn		X					X		X			X	7.5	6.8	8.2	9.5	9.5	10.4	11.1
P18Mn		X						X	X			X	7.9	7.5	9.1	10.1	10.9	12.4	13.2
P19Mn		X	X							X		X	10.1	10.0	10.9	11.8	12.3	13.2	13.9
P20Mn		X		X						X		X	5.2	3.9	4.3	5.0	6.4	7.0	9.1
P21Mn		X			X					X		X	12.5	12.1	12.7	14.6	14.6	15.6	15.9
P22Mn		X				X				X		X	10.8	10.2	11.0	12.6	13.1	14.2	14.2
P23Mn		X					X			X		X	7.2	7.0	8.4	9.3	9.5	10.4	10.2
P24Mn		X						X		X		X	7.7	7.3	9.0	9.6	10.7	11.8	11.9
Average													10.2	9.6	10.5	11.6	11.8	12.8	13.6
Standard deviation													2.8	3.0	2.9	3.1	2.9	2.7	2.5

Table 2

Average profile of poor according to various factors used in the estimates, 2016

	Average	Median	Income	Consumption	Income and flow of net wealth	Income and flow of financial assets	Income and wealth (4 years)	Income and financial assets (4 months)	OECD e. scale	Squared root e. scale	No spatial deflator	Spatial deflator
Gender												
Male	91	90	90	90	91	89	94	92	91	90	90	91
Female	111	113	113	113	112	115	108	111	111	113	113	111
Age												
Up to 34 years	167	174	161	144	179	166	193	181	161	181	165	176
From 35 a 44 years	149	156	149	127	154	147	175	161	146	159	153	151
From 45 a 54 years	128	133	134	125	134	129	130	130	131	130	127	134
From 55 a 64 years	90	88	89	97	89	93	77	88	93	84	91	86
More than 64 years	50	43	46	58	41	47	47	43	45	48	47	46
Education												
None	114	114	116	118	95	117	133	107	109	120	124	105
Primary school certificate	131	131	131	136	121	133	132	132	129	133	132	129
Lower secondary school certificate	143	150	147	145	145	147	149	148	147	146	144	149
Upper secondary school diploma	57	49	53	52	61	54	47	52	52	54	56	50
University degree	26	24	24	27	27	22	27	24	27	23	22	28
Number of components												
1	71	69	75	52	76	76	76	66	61	80	69	72
2	54	49	52	49	53	55	46	54	47	56	53	50
3	78	75	76	77	79	78	72	77	75	78	76	77
4	147	153	148	157	146	146	154	150	157	144	150	150
Work status												
Blue-collar	147	137	136	125	154	136	165	138	143	142	142	142
Office worker	32	30	30	36	33	30	30	28	31	31	31	31
Executive clerk	1	0	0	0	1	0	0	0	1	0	1	0
Manager	0	0	0	0	0	0	0	0	0	0	0	0
Business-owner, member of profession	31	31	35	50	24	21	24	31	28	34	29	33
Other self-employed	83	89	88	144	83	78	53	69	84	87	87	84
Retired and other not employed	123	127	128	119	120	130	121	132	125	125	125	125
Marital status												
Married	98	98	97	102	98	96	97	98	100	96	99	97
Single	102	102	104	81	107	109	108	104	97	108	99	105
Divorced	134	134	134	124	140	139	136	129	129	138	128	139
Widow/er	86	89	90	92	78	88	87	90	82	93	87	88
Place of birth												
Abroad	278	280	281	281	283	279	282	282	284	283	285	282
Italy	81	81	81	81	81	81	81	81	80	80	80	81
Population size												
Up to 5,000 inhabitants	100	92	93	121	99	97	78	86	94	97	103	89
From 5,000 a 20,000 inhabitants	87	91	89	93	85	83	98	86	89	89	88	90
From 20,000 a 50,000 inhab.	101	98	101	91	105	105	91	105	100	99	104	95
From 50,000 a 200,000 inhab.	110	113	114	94	109	116	120	116	112	111	109	114
More than 200,000 inhabitants	109	113	110	102	111	109	119	116	111	111	102	121
Geographical area												
North	81	83	77	90	78	76	94	79	82	83	71	93
Centre	57	52	59	48	63	58	46	55	55	55	48	62
South and Islands	149	149	153	143	150	156	139	153	150	148	168	130
Total	100	100	100	100	100	100	100	100	100	100	100	100

4   Poverty indicators and perceived bad economic conditions

Considering the heterogeneity of results, it is interesting to analyse which of the proposed indicators is most associated with the indicator of perceived bad economic conditions, that typically characterize poverty. As we have said, in the present work we consider as a criterion for evaluating the indicators the ability to represent the economic distress perceived by the subjects. We are aware that subjective indicators can be affected by

measurement errors; the hypothesis on which this analysis is based is that the errors are random and that in comparison they do not favour one indicator over another.

The fact that the considered poverty indicators estimate many different percentages of poor introduces some complications in the comparison. An indicator that selects a low share (for example the one that excludes from the poor those with financial assets greater than 3 times the monthly poverty line) is, in fact, more likely to identify subjects that are dissatisfied with their economic conditions (high sensitivity), but at the same time, risks not identifying all the poor (low specificity).

Different statistical indices take this trade-off into account. In the following, we will conduct the comparisons abandoning the concept of the poverty threshold and focusing on the ability of the indicators to order households in a way that is consistent with the dissatisfaction of their economic conditions. Therefore, comparative evaluations will be carried out with the same share of subjects included in the left tail of the indicator distribution. In this way we will be able to compare, for example, 5 per cent of subjects considered poor according to the indicator of equivalent income with the same share of subjects considered poor in terms of another indicator, by evaluating their respective association with the perceived bad economic conditions.

Table 3 shows the results of these evaluation experiments, considering for each indicator (defined in the different combinations listed above) and for different shares of subjects belonging to the left tail of the distribution (from 5 to 30 per cent) the average in the entire period between 2004 and 2016 of those who report having economic difficulties. The table shows in grey the maximum values found between the indicators, for each share of individuals in the left tail of the distribution.

The indicator that best identifies those households reporting economic difficulties is the one that combines the equivalent income with the availability of sufficient financial assets to overcome the poverty threshold for 3 months, without a spatial price deflator. In the left tail, the OECD equivalence scale is slightly preferable to the scale based on the square root while over a certain limit the opposite occurs.

Table 3

Share of individuals who report bad economic conditions, 2004-2016

	Indicator										Share of individuals in the left tail of the indicator's distribution					
	Income	Consumption	Income and flow of net wealth	Income and flow of financial assets	Income and wealth (4 years)	Income and financial assets (4 months)	OECD e. scale	Squared root e. scale	No spatial deflator	Spatial deflator	5	10	15	20	25	30
Average 2004 - 2016																
P1	X						X		X		90.9	84.8	79.9	75.7	70.8	66.6
P2		X					X		X		81.9	74.6	70.1	66.1	62.4	59.1
P3			X				X		X		90.8	85.5	80.0	75.0	69.8	65.9
P4				X			X		X		91.7	85.8	80.2	76.1	70.8	66.9
P5					X		X		X		91.1	84.4	78.0	71.4	66.4	62.3
P6						X	X		X		93.8	87.4	82.5	76.6	71.7	67.5
P7	X							X	X		90.0	84.7	80.1	75.2	70.7	66.9
P8		X						X	X		80.5	75.8	70.4	66.0	62.9	59.3
P9			X					X	X		91.0	84.7	79.8	74.3	70.1	65.9
P10				X				X	X		91.2	85.6	80.6	75.5	71.1	67.1
P11					X			X	X		91.5	83.5	77.6	71.2	66.1	61.7
P12						X		X	X		93.7	86.7	81.6	76.7	72.0	67.6
P13	X						X			X	87.7	82.8	78.5	73.5	69.7	65.7
P14		X					X			X	78.0	71.4	65.5	61.9	58.7	55.8
P15			X				X			X	88.4	82.9	77.6	73.0	68.8	64.7
P16				X			X			X	89.4	83.3	78.8	73.7	70.0	66.0
P17					X		X			X	87.9	82.4	75.0	70.4	65.2	60.7
P18						X	X			X	91.0	85.8	79.6	75.1	70.6	66.5
P19	X							X		X	87.0	82.2	76.9	73.4	69.2	65.4
P20		X						X		X	76.9	70.9	66.1	61.9	58.2	55.9
P21			X					X		X	87.5	82.3	76.5	72.6	68.2	64.5
P22				X				X		X	87.8	82.9	77.4	73.6	69.3	65.6
P23					X			X		X	87.2	81.1	75.2	70.1	64.8	59.9
P24						X		X		X	90.2	85.1	79.1	74.5	70.7	66.8
2014																
P1	X						X		X		93.2	90.9	88.9	86.5	81.0	77.4
P2		X					X		X		88.2	85.4	81.3	76.0	71.9	67.6
P3			X				X		X		94.1	91.9	89.0	86.3	81.1	77.1
P4				X			X		X		94.0	92.7	89.1	87.4	81.5	77.4
P5					X		X		X		94.1	93.4	88.8	81.7	76.8	71.7
P6						X	X		X		95.4	92.2	90.2	86.0	81.7	77.2
P7	X							X	X		93.5	92.5	89.1	84.6	81.0	77.3
P8		X						X	X		88.1	86.2	84.4	76.1	71.9	67.8
P9			X					X	X		93.4	91.7	88.6	83.6	80.9	76.4
P10				X				X	X		93.3	93.3	89.5	85.4	81.3	78.0
P11					X			X	X		94.5	91.9	86.5	80.9	76.5	70.9
P12						X		X	X		95.1	92.7	89.4	85.5	81.9	77.3
P13	X						X			X	93.0	91.5	86.8	82.7	79.8	75.7
P14		X					X			X	87.6	83.4	77.0	71.9	67.2	64.8
P15			X				X			X	92.9	92.2	86.5	83.0	79.9	74.8
P16				X			X			X	92.9	91.9	86.7	84.2	79.7	76.1
P17					X		X			X	93.7	91.5	84.2	81.2	75.1	69.5
P18						X	X			X	94.5	92.9	87.0	84.3	79.7	76.1
P19	X							X		X	92.3	90.7	86.2	82.7	79.2	75.8
P20		X						X		X	87.5	83.1	77.3	73.4	68.2	65.4
P21			X					X		X	94.1	91.7	85.0	82.4	78.8	74.9
P22				X				X		X	92.5	91.3	86.3	83.8	79.3	75.3
P23					X			X		X	94.6	90.7	84.5	79.5	74.3	68.5
P24						X		X		X	94.3	92.4	86.5	83.1	80.2	75.6
ISEE 2014*									X		94.2	92.0	87.9	81.7	76.2	73.7
ISEE 2014**										X	93.7	90.1	85.7	81.0	76.1	72.7
ISEE 2010*									X		93.6	88.1	82.1	75.9	69.9	64.9
ISEE 2010**										X	93.4	86.1	83.3	75.2	68.6	64.3

(*)ISEE computed on gross income. (**)ISEE computed on gross income and adjusted with spatial deflators.

As before, a synthetic evaluation of the effects due to the various factors considered was obtained through linear regressions (one regression for each share of households in the right tail) conducted on the values reported in the table and on the dummies that identify the different effects.

The coefficients, reported in figure 2, show that on average the indicator that is most effectively associated with the condition of perceived distress is the one that identifies the poor starting from the equivalent income, excluding those with financial assets able to support them above the threshold in the short term. Compared with the equivalent income, this indicator includes a greater frequency (of about 4 percentage points) of households reporting economic difficulties in the left tail of 5 per cent of subjects. The advantage of this indicator over equivalent income decreases but remains significant as less disadvantaged situations are considered: for example, in the subgroup representing the lowest 30 per cent, the share of people who declare subjective difficulties is 0.9 per cent higher than the corresponding share found for equivalent income alone. Equivalent income increased by the income flow obtained from the liquidation of financial assets shows a slight improvement compared with equivalent income alone, but less than the previous indicator.

The indicator that complements income with the flow of resources obtained from the divestment of wealth involves only marginal improvements compared with the case of income only in the extreme tail (up to 5 per cent of subjects), with a worsening instead in the least extreme tail.

The use of consumption, on the other hand, leads to estimates that are always considerably less effective than those based on income, since there are frequencies of situations of perceived bad economic conditions that are much lower than income (about 8-10 percentage points) for all the various subsets considered in the left tail. This result is probably due to the lower quality of the consumption indicator in the SHIW, which concentrates its survey efforts on income and wealth and devotes only a few questions to consumption. [15] [16]

The low ability of the consumption indicator to detect a condition of economic distress in the SHIW is also confirmed by some other experiments. For example, a principal component analysis of all the indicators used so far shows that those with the highest correlation with the first principal component, which we can interpret as the latent variable expression of household economic well-being, are those that combine income and wealth; consumption has a much lower correlation with the main axis. Moreover, the Heise indexes (1969) indicate that poverty conditions defined on the basis of income or income and wealth indicators are more reliable than those based on consumption. [17]

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[15] The results reported here have been replicated using as a dependent variable the perceived state of dissatisfaction, defined as a score of 5 or less in the answer to the question: "Considering all aspects of your life, how happy do you think you are? Answer by giving me a grade from 1 to 10 where 1 means "Extremely unhappy", 10 means "Extremely happy" and the intermediate values are used to grade your answers. In this formulation, both the worst performance of consumption compared with income and that of the indicators adjusted for prices compared with indicators with uniform prices are fully confirmed.

[16] According to a recent study on data taken from the New Zealand General Social Survey (Carver and Grimes, 2019), consumption is a more effective predictor of subjective well-being than income.

[17] For application of the Heise indices to SHIW data, see Baffigi et al., 2016.

The use of the OECD equivalence scale appears, for all the sub-sets considered, preferable with respect to the square root equivalence scale of the number of components; however, the gap is modest (approximately half a percentage point). [18]

On the contrary, the use of spatial deflators involves a significant reduction in the association with the condition of perceived economic difficulty, in the order of 2-3 percentage points. [19]

Figure 2

**Association between poverty indicators and
perceived bad economic conditions, 2004-2016**[*]

(share of individuals declaring perceived bad economic condition in the left tail of distribution – difference from the benchmark) **[**]
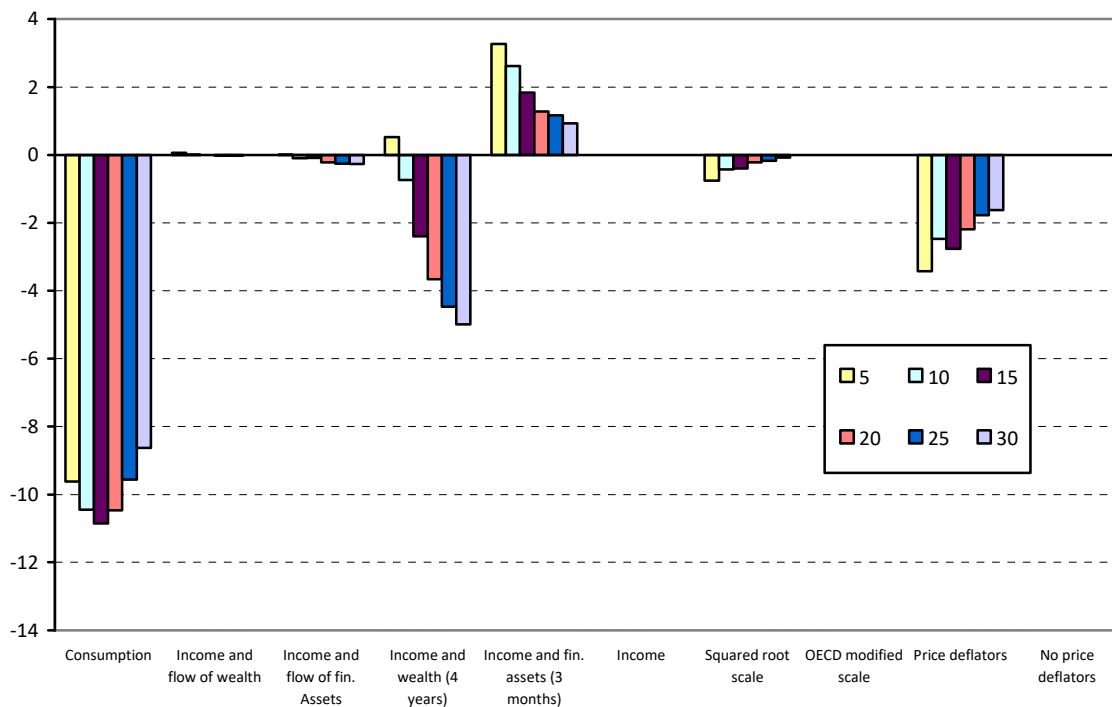
(*) Estimate obtained with separate regressions for subsets of units belonging to the left tail of the distribution with only marginal effects on the data from 2004 to 2016 (168 observations per regression; R^2 between 0.89 and 0.98). The model includes a marginal year effect, not shown in the figure (see Appendix E).
(**) Difference in estimates (on average) with respect to what was obtained using equivalent income, the OECD equivalence scale, uniform prices.

The same exercise was performed separately for the two geographical areas, Centre and North on the one hand and South and Islands on the other; for simplicity, Figure 3 only shows the coefficients relating to the left tail of the distributions composed by 15 per cent of individuals.

The results in the two areas are similar; both in the Centre and North and in the South and Islands, consumption is definitely less effective than income in identifying situations of

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[18] Appendix C shows the values of Table 2 calculated with different equivalence scales: the unmodified OECD equivalence scale, the scale $n^{0.25}$, $n^{0.75}$ and the scale used in the ISEE. In all these cases, the results show on average worse performance than the scales considered in the text.

[19] Some experiments carried out show that smaller price gaps between areas (obtained by proportionally attenuating the coefficients estimated on the basis of Istat data) do not improve the association with respect to the case of uniform prices.

perceived bad economic conditions, while among the indicators that also include wealth, only the one that considers the financial assets needed to overcome the lack of income for 3 months performs better than income. The coefficient related to price deflators is not significant in both areas.

The results are similar for the 3 macro professional categories (employees, self-employed and retired); among the self-employed, however, the indicator that also considers the availability of a small sum of financial assets does not help to distinguish situations of economic difficulty from the others.

Figure 3

Association between poverty indicators and perceived bad economic conditions by geographical area and work status, 2004-2016[*]

(share of individuals declaring bad economic conditions in the left tail of the distribution – difference from the benchmark) **[**]
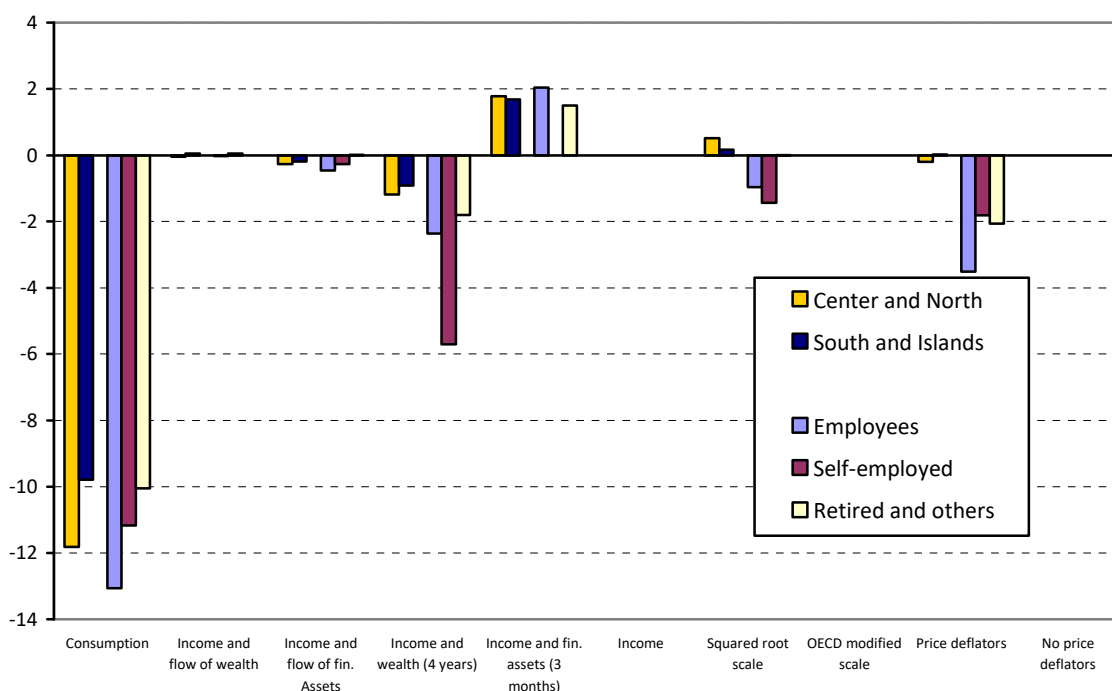
(*) Estimate obtained with separate regressions for subsets of units belonging to the left tail of the distribution equal to 15 per cent of individuals with only marginal effects on the data from 2004 to 2016 (168 observations per regression; R^2 greater than 0.96 in the Centre and North and between 0.63 and 0.93 in the South; between 0.79 and 0.97 among employees, between 0.76 and 0.95 among the self-employed and between 0.80 and 0.98 among pensioners). The model includes a marginal year effect, not shown in the figure.
 (**) Difference of estimates (on average) from what was obtained using equivalent income, the OECD equivalence scale and uniform prices on the territory.

Table 3 also shows how the ISEE index is associated with perceived economic conditions in 2010 and 2014, years for which gross income data are available; the results in 2014 can be compared with the values obtained for the other indicators in the same year.

Overall, the ISEE index has a good capacity to identify situations of bad economic difficulty perceived by households, higher than that of equivalent income and consumption alone. In 2014, the ISEE results are not too different from the other indicators that combine income and assets in various ways.

As to the comparison of the ISEE index with a new version obtained by dividing its values by a spatial deflator, what has already been said is confirmed, namely that slightly better results are obtained when the index is not adjusted for prices (Figure 4).[20] This result is probably attributed to the poorer conditions of public services and the socio-economic context that is usually associated with territories with lower prices of market goods, which the price index does not take into account (D'Alessio, 2017). In other words, the low prices in a territory are a sign of discomfort attributable to factors of various kinds, of which families are aware.

Figure 4

Share of individuals declaring bad economic conditions according to estimated ISEE
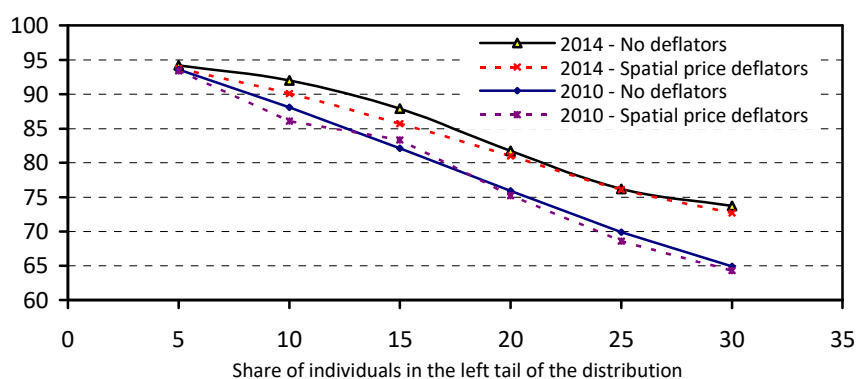
Finally, further versions of the ISEE index, obtained using different equivalence scales, were evaluated. Overall, the application of the modified OECD scale to the ISEE index seems to provide better results than the official ISEE; the square root equivalence scale produces more ambiguous results instead (Table C2, Appendix C).

5   Conclusions

In the present paper, we carried out a comparative evaluation of several relative poverty indices obtained by combining different criteria, such as the economic indicator, the equivalence scale, the choice of a spatial deflator or not across geographical areas. The experiment was conducted on data from the Bank of Italy's Survey of Household Income and Wealth (SHIW), from 2004 to 2016.

First of all, the performance of the various indicators was examined in terms of the level of the indicators themselves. According to this analysis, considering half of the average instead of half of the median for the identification of the poverty threshold implies an average increase in the relative poverty index of almost 5 percentage points; the equivalence scale obtained as a square root of the components instead implies a reduction in the index of about 0.5 percentage points compared with the modified OECD scale, while the introduction

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[20] In the calculation of the ISEE index there are some significant margins of approximation, including the fact that while the legislation provides that cadastral values for houses (IMU values) be used, they are not available in the survey and are replaced by the market prices declared by the respondents. Some of the experiments carried out, however, confirm the results obtained in the text, even using lower property values than those declared by the respondents.

of a spatial deflator across geographical areas and municipalities reduces the relative poverty index by about 2 percentage points compared with the case of uniform prices on the national territory.

As far as the indicator used is concerned, the use of consumption estimates on average a lower spread of poverty by about 6 percentage points compared with income, which in this study we consider as a benchmark. The income increased by the life annuity obtainable with the liquidation of net wealth determines on average an increase of more than 4 percentage points, while the same criterion applied only to financial assets involves an increase of about 1 percentage point. The other two definitions that, compared with the condition defined on the basis of income, exclude from poverty those subjects who can overcome the absence of income on the basis of wealth and financial assets for 4 years or 3 months respectively, involve frequencies that are 4.1 and 2.7 percentage points lower than the benchmark.

The various approaches tend to reflect differently on groups of households. For example, adopting an approach based on income or consumption tends to underestimate the number of poor people among young people compared with indicators that also include wealth, as does the ISEE. The adoption of spatial deflators, on the other hand, reduces the share of the poor in the South and Islands and in smaller cities, while it increases the share in the Centre and in the North of the country and in bigger municipalities.

The extreme variety of the results obtained suggests that the comparison between the indicators should be deepened, seeking out which of them is best able to represent the phenomenon. The analysis has therefore tried to identify among all the examined indicators the one that maximizes the association with the perceived bad economic difficulties, on the basis of the hypothesis that – on average – objectively defined poverty measures should find a mirror in the perceptions of bad economic conditions among households.

The experiment led to the following results:

- the indicator with the highest association with perceived bad economic difficulties is the equivalent income, in the version that excludes from poverty those whose financial assets are able to provide possible support for at least 3 months;

- the indicator that complements income with the income flow that is obtained from the liquidation of financial assets also has a better performance than that of the equivalent income only, but more limited than the previous one; the indicator that instead includes the income flow of all the wealth involves only marginal differences compared with the case of equivalent income only, not always improving the association;

- equivalent income, in turn, always performs much better than equivalent consumption;

- the ISEE index has a good overall ability to identify situations of economic difficulty perceived by households, higher than that of income and consumption alone, and not too dissimilar to that of the other indicators that combine information on income and assets;

- the use of the modified OECD equivalence scale appears slightly more effective than the square root equivalence scale of the number of components (which is in turn better than the scales that consider 0.25 or 0.75 as the exponent of the number of components at the same time); the results are also better than those obtained with the so-called unmodified OECD scale;

- the use of spatial deflators across areas and cities does not imply, on average, a stronger association with perceived economic distress; on the contrary, deflators tend to worsen the performance of indicators;

- also in the case of ISEE, the adoption of spatial deflators provides a weaker association with the perceived economic conditions compared with the indicator based on uniform prices.

Overall, the results seem to suggest that the indicators with the best capacity to identify poverty conditions are those that combine income and wealth, including the ISEE. Consumption, on the other hand, provides comparatively modest results, although the poor performance could depend on the sub-optimal quality of the SHIW indicator.

Further studies are needed to assess the extent to which the above considerations are strictly linked to SHIW data or can be extended to different data sources.

Appendix A –Spatial deflators implicit in Istat poverty thresholds

<div align="right">Table A1</div>

Price deflators implicit in Istat absolute poverty thresholds, 2013
(average across household type)

	Metropolitan areas	Large municipalities	Small municipalities
North	1.0000	0.9566	0.9075
Centre	0.9631	0.9165	0.8638
South and Islands	0.7567	0.7346	0.6967

Appendix B – Evaluating the time span for the income-net worth indicators

It is necessary to define the time span to be considered for the indicators that exclude from poverty the households that, despite having an income that is below the poverty line, have sufficient wealth (total or financial) to raise them above the poverty line for a certain time.

To this end, combinations of the two indicators (total and financial wealth) over a time period of three months, six months, one year, two years and four years, with the two scales of equivalence and with or without price adjustments, as described in the text, have been considered. For each indicator thus obtained, the sub-sets falling in the left tail of the distribution have been identified, with cumulative frequencies of 5, 10, 15, 20, 25 and 30 per cent, calculating for each situation the share of subjects that express the perception of economic difficulty. The results of the comparison among the different periods considered are reported in table B1 (we report for simplicity only the average values found by the various indicators).

For the variable that considers financial assets, the highest association is found for the period of 3 months, along the entire left tail of the distribution. For the variable that considers net wealth, on the other hand, the best association with the condition of perceived difficulty is found for the period of 4 years, with the exception of the subset formed by 5 per cent of the people.

On the basis of these results, the thresholds of 3 months for financial assets alone and 4 years for net wealth were selected in the text.
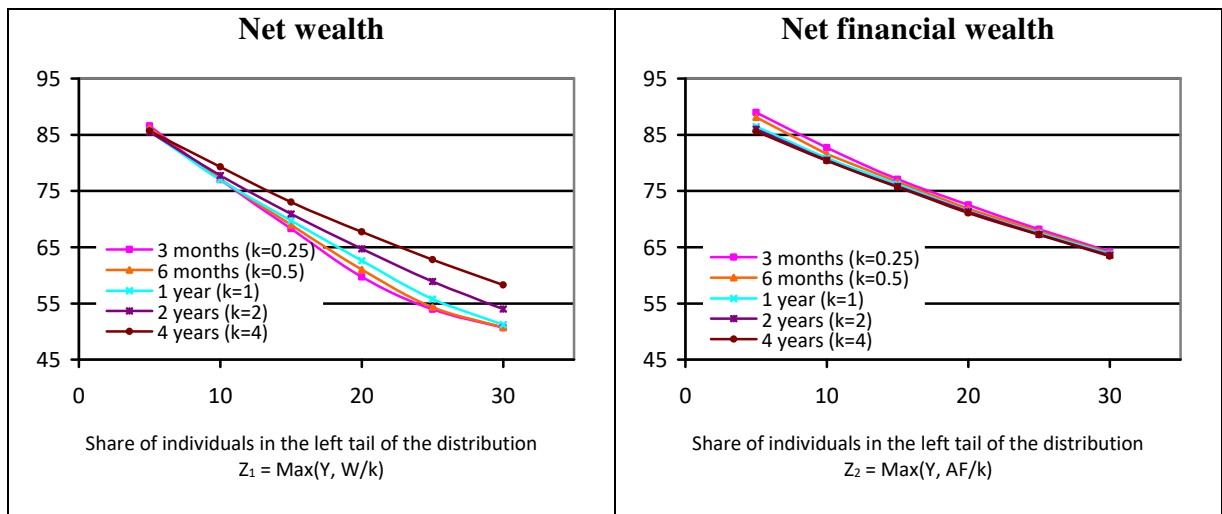
Table B1

Share of households declaring bad economic conditions in the left tail of the distributions defined as the maximum between yearly income and the amount of resources available by liquidating net wealth (total or financial) over time (k=years)

	Percentile of $Z_1 = Max(Y, W/k)$					
	5	10	15	20	25	30
3 months (k=0.25)	86.6	77.0	68.3	59.7	53.9	50.7
6 months (k=0.5)	86.2	77.1	69.0	61.0	54.3	50.7
1 year (k=1)	85.6	77.0	69.7	62.6	55.8	51.2
2 years (k=2)	85.5	77.8	70.9	64.7	58.9	54.0
4 years (k=4)	85.7	79.3	73.0	67.7	62.8	58.3
	Percentile of $Z_2 = Max(Y, AF/k)$					
	5	10	15	20	25	30
3 months (k=0.25)	89.0	82.7	77.1	72.5	68.2	64.2
6 months (k=0.5)	88.1	81.6	76.6	71.8	67.8	64.0
1 year (k=1)	86.5	80.9	76.2	71.4	67.5	63.8
2 years (k=2)	86.0	80.5	75.8	71.3	67.3	63.6
4 years (k=4)	85.6	80.4	75.7	71.1	67.2	63.4

W = Net wealth. FA = Net financial wealth.

Share of individuals declaring bad economic conditions according to various indicators

Net wealth

Net financial wealth

3 months (k=0.25)
6 months (k=0.5)
1 year (k=1)
2 years (k=2)
4 years (k=4)

Share of individuals in the left tail of the distribution
$Z_1 = Max(Y, W/k)$

Share of individuals in the left tail of the distribution
$Z_2 = Max(Y, AF/k)$

Appendix C –Comparative evaluation of some equivalence scales

In this appendix, additional scales of equivalence to those described in the text have been considered. Particular reference has been made to the unmodified OECD scale, to the scales obtained by considering the number of components with an exponent of 0.25 and 0.75 respectively and to the scale used in the ISEE index (described in detail in Appendix D).

Figure C1 shows the relationship between the number of components and economies of scale in the various hypotheses considered; the flatter the curve, the closer to the horizontal axis, the greater the economies of scale.

Figure C1

Number of components and economy of scale according to various equivalence scales(*)
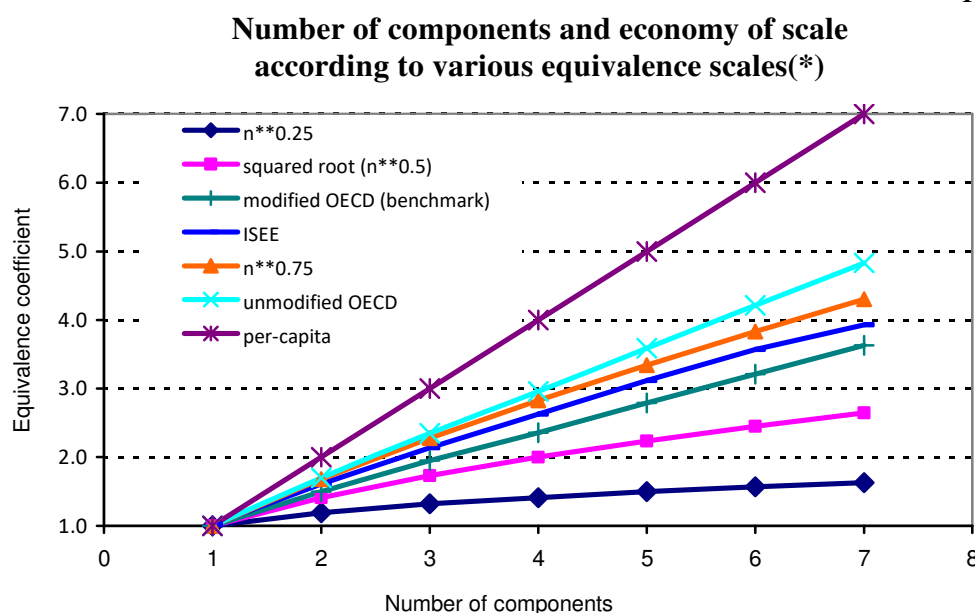
(*) For ISEE, modified OECD and unmodified OECD, average values in 2016 have been considered.

Among those considered, the equivalence scale with the highest economies of scale is the one with exponent 0.25, followed in order by the square root, the modified OECD, the ISEE, the one with exponent 0.75 and the unmodified OECD. For comparison, the graph also shows the curve which, in the hypothesis of the absence of economies of scale, makes the household indicator correspond to the per capita indicator.

Table C1 shows the values relative to the shares of subjects who express a condition of difficulty in the left tail of these distributions modified with the new equivalence scales. The values can be compared with those reported in the text in Table 2.

On average, the modified OECD equivalence scale provides the best association with the perceived economic difficulties compared with the other scales considered, and in particular compared with the unmodified equivalence scale. The equivalence scale used by the ISEE also produces a lower comparison with perceived well-being conditions than that of the modified OECD scale (figure C2).

The equivalence scale with the worst performance seems to be the one that considers the number of components with an exponent of 0.25 (i.e. with higher economies of scale than the square root scale); however, the performance of the scale considering the exponent

of 0.75 (i.e. lower economies of scale than the square root scale) is also worse than the square root equivalence scale. In this class, the square root equivalence scale, therefore, seems to be the one with the best performance.

On the whole, the two scales considered in the text appear to be those capable of guaranteeing the best association with respect to the conditions of perceived economic difficulty.

Figure C2

Average effect of some equivalence scales
on the association with perceived bad economic conditions
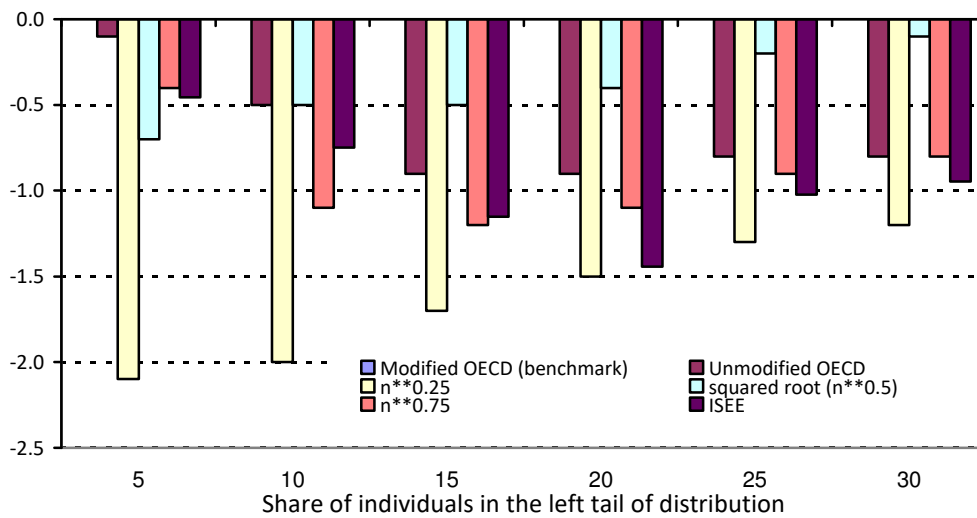*(Modified OECD scale =benchmark)*

Share of individuals declaring bad economic conditions, 2004-2016

				Indicator								Share of individuals declaring bad economic conditions in the left tail of the distribution [*]					
Income	Consumption	Income and wealth (flow)	Income and financial assets (flow)	Income and wealth (4 years)	Income and financial assets (3 months)	OECD unmodified scale	Scale $n^{0.75}$	Scale $n^{0.25}$	ISEE scale	Uniform prices	Spatial deflators	5	10	15	20	25	30
X						X				X		90.2	83.9	78.7	74.0	69.3	65.3
	X					X				X		81.1	74.0	69.0	64.4	60.5	57.6
		X				X				X		90.6	83.5	78.0	72.7	68.9	64.6
			X			X				X		90.8	84.1	78.6	73.9	69.3	65.5
				X		X				X		90.3	83.2	76.9	70.6	65.8	61.7
					X	X				X		93.7	85.8	80.7	75.3	70.2	66.5
X							X			X		89.4	83.2	78.1	73.3	69.2	65.2
	X						X			X		81.5	73.8	69.5	64.8	61.0	57.7
		X					X			X		90.3	83.2	78.0	72.7	68.7	64.5
			X				X			X		90.4	83.4	78.4	73.5	69.2	65.4
				X			X			X		89.9	82.8	75.9	70.5	65.8	61.4
					X		X			X		92.7	85.7	80.7	75.5	70.2	66.4
X								X		X		87.4	82.7	77.7	73.6	69.5	65.3
	X							X		X		80.0	74.3	68.6	64.1	60.5	57.9
		X						X		X		88.5	82.9	77.6	73.8	68.6	65.1
			X					X		X		88.5	83.2	78.4	74.4	69.3	65.5
				X				X		X		88.5	81.5	76.3	69.8	64.8	60.6
					X			X		X		90.9	85.3	79.9	75.5	71.2	66.7
X									X	X		91.0	84.2	79.3	73.9	69.5	65.6
	X								X	X		81.6	74.3	69.2	64.8	61.1	57.9
		X							X	X		90.4	84.3	78.8	73.3	68.9	64.9
			X						X	X		91.2	84.9	79.2	74.1	69.8	65.8
				X					X	X		90.3	83.6	76.4	70.4	65.8	61.6
					X				X	X		93.0	86.5	80.8	75.7	70.7	66.7
X						X					X	86.6	82.1	76.8	72.4	68.1	64.4
	X					X					X	77.1	70.8	64.8	60.7	57.9	55.2
		X				X					X	87.6	82.1	75.8	71.8	67.8	63.6
			X			X					X	87.4	82.3	76.8	72.7	68.4	64.5
				X		X					X	87.1	81.7	74.8	69.6	64.7	60.0
					X	X					X	90.8	84.5	78.6	73.8	69.5	65.4
X							X				X	85.9	81.9	75.4	72.2	68.2	64.3
	X						X				X	77.7	70.4	65.3	60.9	57.9	55.4
		X					X				X	87.6	82.1	75.1	71.3	67.3	63.6
			X				X				X	86.8	81.9	75.9	72.2	68.1	64.6
				X			X				X	86.4	80.1	74.7	69.1	64.2	59.7
					X		X				X	90.2	83.3	78.7	73.6	69.6	65.3
X								X	X		X	86.3	79.9	75.7	70.9	67.0	63.5
	X							X	X		X	73.7	68.2	63.4	60.1	57.1	54.7
		X						X	X		X	85.5	80.3	75.3	70.4	66.8	62.9
			X					X	X		X	85.7	80.7	76.2	71.1	67.5	63.4
				X				X	X		X	85.2	78.8	73.1	68.2	62.9	59.3
					X			X	X		X	88.3	83.3	77.7	73.3	68.8	64.9
X									X		X	87.0	82.4	76.4	72.2	68.2	64.4
	X								X		X	76.6	70.7	65.4	60.8	58.0	55.6
		X							X		X	88.2	82.9	76.3	72.1	67.3	63.6
			X						X		X	87.6	83.3	76.9	72.6	68.3	65.0
				X					X		X	88.0	82.1	75.6	70.6	65.6	61.2
					X				X		X	91.4	86.0	79.9	75.0	70.6	66.3

[*] Average 2004-2016

Share of individuals declaring bad economic conditions, 2010-2014

(difference from ISEE scale (benchmark))

Share of individuals in the left tail of the distribution (*)	Modified OECD scale	scale $n^{0.25}$ scale	$n^{0.50}$ scale	$n^{0.75}$ scale
2010				
5	-0.1%	-0.6%	-0.4%	1.1%
10	1.3%	-1.9%	-0.6%	0.0%
15	0.6%	-2.0%	-0.7%	0.6%
20	0.4%	-0.2%	0.5%	-0.1%
25	0.0%	0.2%	0.6%	0.0%
30	0.4%	-0.4%	0.6%	0.0%
2014				
5	-1.2%	-1.4%	0.1%	-0.4%
10	0.0%	-0.1%	0.8%	-0.1%
15	1.2%	-1.0%	1.0%	0.4%
20	0.5%	-1.7%	0.1%	0.6%
25	2.5%	-0.7%	0.9%	1.6%
30	0.4%	-1.4%	0.1%	0.5%

Appendix D – Estimation of ISEE indicator in SHIW

The Indicator of the Equivalent Economic Condition (ISEE) is made up of three parts: the first is linked to income (known as the Income Situation Indicator or SRI), the second to wealth (the Assets Situation Indicator or ISP) and the third is an equivalence scale (SCALA). In formulas:

ISEE = (ISR + 0.2 ISP) / SCALE.

The income part (SRI) was obtained from the SHIW data contained in the HFCS archives which are appropriately grossed up. Summing for all members of the household:

- income from employment, net of a 20 per cent deduction, with a maximum of €3,000;
- pension income, net of a deduction of 20 per cent, with a maximum of €1,000;
- income from self-employment;
- income from other transfers;
- income from imputed rents, with the exception of those relating to the dwelling of residence;
- financial capital income (estimated at 1.3 per cent of the financial capital held at the end of the year).

If the family lives in a rented home, a deduction equal to the entire amount of the rent paid is applied, up to a maximum of €7,000.

The part related to wealth (ISP) has been calculated as the sum of the following elements:

- 2/3 of the value of the property used as a residence, net of the residual value of the loan, with a maximum deduction of €52,500;
- value of other property held, net of any residual values on loans;
- value of financial assets held, net of a maximum deduction of €8,000.

The sum of SRI and 20 per cent ISP (called ISE, Economic Situation Indicator) should be compared to the equivalence scale determined on the basis of the following factors:

- 1 component: SCALE = 1;
- 2 components: SCALE = 1.57;
- 3 components: SCALE = 2.04;
- 4 components: SCALE = 2.48;
- 5 components: SCALE = 2.85;
- 6 components or more: SCALE = 2.85 + 0.35*(NCOMP-5).

In addition, the following increases shall apply to the scale:

- 3 children: increase of 0.2;
- 4 children: increase of 0.35;

- 5 or more children: increase of 0.5;
- Children under 18: additional increase of 0.2; this increase is set to 0.3 if there is only one working parent or if both parents are working;
- for each disabled component (whose number is estimated in the survey as the sum of disability pensions): a further increase of 0.5.

Overall, the SHIW captures most of the elements of the ISEE. The most approximate source is probably the evaluation of real estate assets, which in the ISEE refers to cadastral values ("IMU values"), while in the survey refers to market values declared by the owner households.

In 2012 the SIWH collected data on a tax based on such cadastral values, making it possible to get an indirect estimate of the cadastral valuations of property held by households together with the declared market values. Some analyses carried out on this data suggest that the estimated cadastral value is quite correlated with the market value (correlation coefficient about 0.5). The ratio between the IMU value and the market value of the residences is 62.4 per cent overall; slightly higher values are recorded in the South and Islands compared with the Centre and North (67.4 against 61.2) and in the suburbs compared with the city centres (62 compared with 56.5 per cent).

Some experiments carried out using a share equal to 60 per cent of the declared real estate values instead of the entire amount show results that are similar to those reported in the text.

Appendix E – Coefficients of the regressions reported in the text (Figures 1 and 2)

Regression coefficients of Figure 1 – Average effect of various computational variants on the poverty headcount rates, 2004-2016

Parameter	Estimate	Pr > |t|
Intercept	13.15476	<.0001
Average	4.82619	<.0001
Median	0	.
Consumption	-5.94107	<.0001
Income and flow of wealth	4.076786	<.0001
Income and flow of financial assets	0.842857	0.0001
Income and wealth (4 years)	-4.20536	<.0001
Income and financial assets (3 months)	-2.70893	<.0001
Income	0	.
Squared root e. scale	-0.51071	<.0001
OECD e. scale	0	.
Spatial deflator	-2.12143	<.0001
Uniform prices	0	.
Year 2006	-0.825	0.0005
Year 2008	-0.01042	0.9644
Year 2010	1.041667	<.0001
Year 2012	1.341667	<.0001
Year 2014	2.010417	<.0001
Year 2016	2.954167	<.0001
Year 2004	0	.
Sample size	336	
R^2	0.94	

Regression coefficients of Figure 2 - Average effect of various computational variants on the association between poverty indicators and perceived bad economic conditions, 2004-2016

	Share of individuals in the left tail of the distribution											
	5		10		15		20		25		30	
Parameter	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|	Estimate	Pr > |t|
Intercept	95.1298	<.0001	88.5512	<.0001	83.728	<.0001	78.5982	<.0001	73.6256	<.0001	69.1619	<.0001
Consumption	-9.61071	<.0001	-10.4464	<.0001	-10.85	<.0001	-10.4607	<.0001	-9.56071	<.0001	-8.625	<.0001
Income and flow of wealth	0.525	0.4391	0.21786	0.6834	-0.36786	0.4038	-0.72857	0.034	-0.875	0.0092	-0.88929	0.0039
Income and flow of financial assets	1.1	0.1062	0.80357	0.1338	0.40357	0.3598	0.26071	0.4452	0.21786	0.5121	0.25357	0.4046
Income and wealth (4 years)	0.53214	0.433	-0.74643	0.1636	-2.4	<.0001	-3.65714	<.0001	-4.46786	<.0001	-4.98571	<.0001
Income and financial assets (3 months)	3.26429	<.0001	2.61429	<.0001	1.83929	<.0001	1.28214	0.0002	1.16786	0.0006	0.93571	0.0024
Income	0	.	0	.	0	.	0	.	0	.	0	.
Squared root e. scale	-0.67262	0.0872	-0.46905	0.1296	-0.36071	0.1571	-0.27262	0.1677	-0.13214	0.4911	-0.09643	0.5828
OECD e. scale	0	.	0	.	0	.	0	.	0	.	0	.
Spatial deflator	-3.26548	<.0001	-2.53095	<.0001	-2.87024	<.0001	-2.17262	<.0001	-1.79643	<.0001	-1.61548	<.0001
Uniform prices	0	.	0	.	0	.	0	.	0	.	0	.
Sample size	168		168		168		168		168		168	
R^2	0.88		0.94		0.96		0.98		0.98		0.98	

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