Changes in wealth distribution in Italy (2002-2012): Who gained from the Great Recession?

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The analysis of changes in the distribution and concentration of wealth (as well as income) must be framed within a wider-ranging analysis of the socio-economic developments in Italy in the last fifteen years. In the next pages, after this preliminary introduction, we are going to: illustrate the changes in families' assets between 2002 and 2012; measure changes in the degree of inequality; and identify which social groups (or classes) have gained from these changes, using the decomposition procedure of the Gini concentration ratio proposed by Dagum (1997). Ultimately, our aim is to improve our knowledge on the determinants of income and wealth concentration.

The aim of the paper is however not merely descriptive. Even if the majority of the literature on economic inequality has considered families' income as the key variable (Davies, 2011), the personal (and familial) distribution of wealth actually constitutes the key issue of economic and social inequality in contemporary societies. As a matter of fact volatility of incomes is nowadays pervasive, especially for the young generations, so that, at least in Italy, intergenerational transfers are very common. Temporary jobs, low levels of wages and multiple spells of unemployment increase the dependence of young people from their original household.

In such a situation household wealth becomes a guarantee against fluctuations of income, in order to maintain (or not to lower) the standard of living. So it constitutes a sort of financial buffer. From this point of view we must make a distinction between different types of wealth, mainly considering the level of liquidity. In this work, such distinctions are made excluding the value of the households' home.

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As Gini already clarified more than a century ago (1914, p. 5) the issue of inequality is, ultimately, a political question. This issue is reflected also in debates surrounding its measurement: for example, Kolm (1969) discusses the predominantly normative character of various measurements of the degree of income inequality.[1] In the last decade, scholars' and commentators' attention has focused on the increasing degree of economic inequality, apparently worried about the consequences associated with increasing inequality (see for example Davies et al., 2016, 2008; Dell et al., 2005; Goda and Lysandrou, 2011; OECD, 2008, 2011; Piketty and Saez, 2003, 2006; Piketty, 2011, 2014; Piketty et al., 2006; Turner, 2010; Wolff, 2010, 2016). In particular, these scholars focus on two fundamental problems: the prospects of economic growth, and the challenges that growing inequality poses to the democratic order.

This paper contributes to the existing debate about the determinants of wealth concentration by providing an in-depth empirical investigation on the Italian case. In particular, we examine the evolution of families' assets in Italy between 2002 and 2012, investigating changes in the degree of wealth inequality and seeking to identify which social groups have ultimately benefited from these changes.

Our paper also introduces two important methodological innovations. The first is the definition of household wealth that we use, which is net wealth minus the value of the household's home, if owned. At the same time, we decrease household's debt by subtracting the amount of residual mortgages from the total debt. The distribution of this new variable (*WNet*) is very different from the original one, and its analysis gives us new insights on the patterns of inequality in Italy. Moreover, the new distributions reveal a fair number of households with negative wealth. To deal with this, we developed a new method for computing the Gini coefficient with negative values and for decomposing it, drawing on Dagum's (1997) decomposition method.

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[1] Kolm (1969) states "a concept of inequality is normative or is not. Hence, when we speak of inequality, we speak either of dispersion or of injustice".

To our knowledge, this paper is the first to focus simultaneously on Gini's decomposition and the treatment of negative values and to find a consistent solution for both.

The paper is structured as follows. The next section presents a review of the literature, while section 2 contains a survey of the statistical sources of our data and the motivation and methodology for the computation of our key variable, *WNet*. Sections 3 presents the Gini decomposition method while section 4 shows the main results of the exercise. Brief conclusions are drawn in section 5.

1. Literature review

During the last two decades, a number of theoretical studies have postulated a negative link between inequality and growth (Galor and Zeira, 1993), a theory supported by various empirical calculations (Easterly, 2001). More recently, Stockhammer (2009, 2015) and van Treeck and Sturn (2012) have argued that reducing inequality is crucial for macroeconomic stability, as poorer income groups have high marginal propensity to consume. On the other hand, empirical studies have pointed out a positive relationship between economic inequality and growth for underdeveloped countries and a negative one for developing countries (Barro, 2000). Yet other reports have shown a non-linear relationship between income inequality and economic growth (Banerjee and Duflo, 1993). In the case of Italy, the latest studies (Vecchi, 2011) show that the Kuznets curve, construed as a long-term relationship, is not supported by empirical evidence.

Addressing the problem of variations in income and wealth and the resulting variations in the level of economic inequality, standard economic theory starts with the aggregate distribution of the value added to production factors (land, labour, and capital), and then relates primary income distribution to the productivity (or remuneration) of such factors. Finally, the standard theory links variations in the rate of remuneration to variations in marginal productivity, which in turn is determined by technology, economies of

scale and the composition of demand. Moreover, for what concerns the origins of the increase in wealth concentration, some authors have recently pointed out the importance of asset returns in driving changes in wealth inequality (Scheve and Stasavage, 2015; Wolff, 2016), and consequently stressed the key role of fiscal (Dell et al., 2005) and monetary policies (Domanski et al., 2016).

To sum up, we can thus observe how recent literature on the origins of income inequality links it to the effects of labour, fiscal and monetary policies and to the consequences of globalization and technological change. In substance, income inequality appears to be the result of a complex interplay between political and economic factors, which still requires in-depth research in order to clearly establish the causal connections.

Alongside the work on income distribution, there has been a growing interest about other variables that contribute to individual wellbeing, especially health status, but also education, environment, personal security, and so on (Davies et al., 2008; Saez and Zucman, 2014). Household wealth is another dimension of human wellbeing, for it raises long term consumption, helps to protect households against adverse events and helps to finance the informal sector.

Despite its importance, relatively few studies have investigated household wealth distribution, because data limitations have hindered research on this topic (Davies, 2011). In recent years, a large stream of literature has underlined the role wealth concentration had in causing the Great Recession (Di Nardi et al., 2016; Fernandez et al., 2008; Goda and Lysandrou, 2011; Lysandrou, 2011; Palma, 2011, 2009; Stockhammer, 2009; Wade, 2009). These scholars argue that poverty and low income were among the "supply/push" factors in the growth of Collateralized Debt Obligations (CDOs), while mortgage loans constituted the raw material, and wealth concentration was one of the "demand/pull" factors. According to this literature, wealth concentration plays a great role in preventing economic growth and in favouring the explosion of financial crises.

 Last but not least a growing stream of literature emphasizes the dangers that inequality (especially wealth inequality) holds for

representative democracy. Notably, it has been argued that there is a connection between the transition to so-called "post-democracy" (Crouch, 2004) and the increasing concentration of income and wealth (see also, among others, Bollen and Jackman, 1995; Acemoglu Robinson, 2000, 2006; Berti, 2008; Bonica et al., 2013; Fitoussi, 2004; Przerworski, 2000). The evidence seems to be inconclusive, and a relatively large body of academic literature has not reached a consensus on the relationship between inequality and democracy. Anyway, recent works by Acemoglu et al. (2014) show that after the transition from dictatorship to democracy, many countries experienced sustained economic growth.

On a more general level, evidence supports the proposition that income and wealth concentration depresses political participation and active citizenship (Soci et al., 2014). Our opinion is that a very high degree of economic concentration is not compatible with representative democracy, a proposition that has long-standing presence in the democratic tradition, both Atlantic (Jefferson) and continental (Rousseau); however we do not further address this point in this paper.

2. Data and definitions

This paper uses the data from the Bank of Italy's Survey on household income and wealth (SHIW) to analyze the dynamics of income and wealth distribution of Italian households in the 2002-2012 period. The survey is commonly recognized as the main source of data on the income and wealth of Italian households. It consists of a biennial rotating panel that is representative of all Italian households (Bank of Italy, 2016). The treatment of data and the definition of estimators is well described in the Bank of Italy methodological papers; we adopt those methodologies and definitions in our work.

The definition of household wealth used in SHIW does not include the wealth derived from pensions. Data concerning wealth are collected in the survey and elaborated through the analytical

evaluation of numerous different kinds of assets. In short, total wealth is determined by summing up financial and real assets and subtracting liabilities. Financial assets include deposits and corporate and government bonds and loans, while real assets consist of properties (mainly homes), owned companies and valuables. Finally, liabilities are the amount of debts towards banks or other families.

Although such a definition is correct from an economic standpoint, it is not suitable for measuring the ability of families to cope with liquidity problems or their capability of planning long-term expenditures. This is due to two main problems: first of all, real assets are evaluated using 'virtual' prices (such as home average prices per square meter); secondly, the home, especially the first residence, cannot be considered a liquidity buffer.

The above statements are especially important in Italy, where about 70% of households own their first residence house and where the housing market has been strongly volatile in recent years. Furthermore, the value of first houses accounted for 60% of total wealth in 2014, and excluding these assets, about 10% of households change from positive to negative assets.

In light of the above considerations, in our work we will consider a slightly different definition of wealth, excluding from total assets the value of the house of residence and from total liabilities the residual amount of loans and/or mortgages to be paid for the first house. Hereafter we will label this kind of wealth as *WNet*.

3. The decomposition of the Gini index and the problem of negative observations

Usually, the decomposition of inequality between and within groups is carried out with reference to the Theil index[2] or a similar decomposable inequality measure, because the Gini index (denoted by

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[2] Theil's index is usually weighted by income or wealth shares. As it is an absolute measure of concentration (it depends on the total number of units in the sample), comparisons through time or between countries or subpopulations are not possible.

G) does not exhibit perfect decomposability (Pyatt, 1976). In what follows, we try to fill the gap by using Dagum's decomposition[3] of Gini's concentration index. It is well-known (Dagum, 1997; Lambert and Aronson, 1993) that the decomposition of the Gini ratio into the contribution due to the inequality *between* groups (G_{nb}) and the contribution due to the inequality *within* groups (G_w) gives rise to a residual term (G_t), caused by the possible overlap of the variation fields of the variable of interest (y, i.e. wealth) between groups. This is a point of major interest when using the Gini index, as we are able to analyze the transvariation among sub-distributions. Here we shall follow Dagum's approach to the decomposition of the Gini income inequality ratio (1997, pp. 524 ff.) demonstrating that the Gini ratio of a population divided into k subgroups of amplitude n_j, $j = 1,2,…, k$, can be decomposed as follows:[4]

$$G = G_w + G_{nb} + G_t$$

with

$$G_{nb} + G_t = G_{gb}$$

so that

$$G_w = \sum_{j=1}^{k} G_j p_j \, s_j$$

where $p_j = n_j/n$, and $s_j = n_j \bar{y}_j / n\bar{y}$. Here, p_j stands for the weight of the *j*-th subgroup out of the total, and s_j stands for the corresponding weight of the character out of the total intensity, and measures the contribution of the inequality distribution within the subpopulations to the total value of the G ratio according to Gini:

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[3] The original formulation by Dagum has n^2 as denominator of the mean difference (that is with replication). In our paper we adopt the more appropriate denominator $n \cdot (n-1)$. In any case, the differences are negligible, given the number of observations.

[4] Another kind of decomposition has been proposed by Yithzaki (1994) and recently applied by Liberati (2015). This method relies on the assumption that the distribution of the variable of interest is log-normal. As Liberati (2015, p. 249) states "countries' surveys are a better representation of true income."

$$G_{nb} = \sum_{j=2}^{k} \sum_{h=1}^{j-1} G_{jh} \, (p_j s_h + p_h s_j) D_{jh},$$

where

$$G_{jh} = \sum_{i=1}^{nj} \sum_{r=1}^{nh} |y_{hi} - y_{jr}| / n_j n_h (\overline{Y_j} - \overline{Y_h})$$

is the extended Gini distribution ratio between the *j*-th subpopulation and the *h*-th subpopulation, and $D_{jh} = (d_{jh} - p_{jh})/\Delta_{jh}$ is the relative economic affluence between the *j*-th and *h*-th subpopulations, with $\overline{Y_j} > \overline{Y_h}$. Here d_{jh} is the weighted average of the differences between the values of character $y_{ji} - y_{hr}$ for all the y_{ji} values of the members belonging to the *j*-th subpopulation and the values greater than y_{hr} of the members belonging to the *h*-th subpopulation; p_{jh} is the weighted average of the differences $y_{hr} - y_{ji}$ for all unit pairs, one taken from the *h*-th subpopulation and the other from subpopulation *j*-th so that $y_{hr} > y_{ji}$ and $\overline{Y_j} > \overline{Y_r}$. When the two averages are equal, D_{jh} is equal to 0, and when the two distributions do not intersect it takes on the value of 1; in all other cases it takes on values between 0 and 1. G_{nb} measures the net contribution of the extended Gini inequality to the total value of the *G* ratio.

Finally,

$$G_t = \sum_{j=2}^{k} \sum_{h=1}^{j-1} G_{jh} \, (p_j s_h + p_h s_j)(1 - D_{jh})$$

measures the contribution of the intensity of transvariation between subpopulations to the total *G* ratio. Therefore,

$$G_{gb} = G_{nb} + G_t = \sum_{j=2}^{k} \sum_{h=1}^{j-1} G_{jh} \, (p_j s_h + p_h s_j)$$

measures the gross contribution of extended Gini inequality between subpopulations.

So, inequality between groups (G_{gb}) is decomposed into net inequality between groups (G_{nb}) and inequality due to transvariation. As this latter term grows, we are allowed to think that the respective distributions are more and more confused.

In our exercise, the sub-populations are built according to the main source of current income of the household (reaching at least 40% of total household income) and are defined as follows: dependent

workers (henceforth "employed"), independent workers and entrepreneurs (henceforth "self-employed"), retired workers ("retired") and others ("mixed"). In other words, families without a prevailing source of income, i.e. mainly couples of individuals with incomes from different sources, are classified in the category "mixed".

The composition of the sample in terms of number of households is as shown in table 1.

Table 1 – *Sample composition, by prevailing source of income*

	2002	**2004**	**2006**	**2008**	**2010**	**2012**
Self-employed	974	916	807	775	832	1,078
Employees	3,259	3,362	3,278	3,286	3,183	2,908
Retired	3,392	3,452	3,384	3,573	3,602	3,410
Mixed	386	282	299	343	334	755
Whole sample	8,011	8,012	7,768	7,977	7,951	8,151
WNET **Total**	594.8	668.4	732.4	712.5	811.1	842.1

Source: Bank of Italy, SHIW, various years.
Notes: *WNET* values are expressed in billion euros at current prices.

In this way we try to bridge the gap between functional income distribution and personal income distribution and to observe if this segmentation has any explicative power in accounting for changes in wealth distribution.

3.1. The decomposition of the Gini index and the problem of negative observations

The main consequence of the definition of *NetWealth* described above is the presence of a quantity of negative values that cannot be ignored. Usually (Stich, 1996), when income is concerned, the presence of negative values is often ignored or addressed by excluding negative values or by setting them to 0. We deal with the problem in

another way, that is by modifying the Gini ratio in order to explicitly consider negative wealth. Full description of the demonstration goes beyond the goal of this paper. Here we report the principal statements, obtained following Dagum (1997; 2006).

Theorem 1. The maximum mean difference in presence of negative wealth is:

$$Max(\Delta) = \frac{2\sum_i |x_i|}{n} = 2\mu^{\#}$$

Proof. Let $x_i \quad i = 1,...,n, \quad with \quad x_i \in \pm\infty$ the wealth of n units, and let us define:

$$X^- = \sum |x_j|, \quad x_j \leq 0$$

$$X^+ = \sum x_j, \quad x_j > 0$$

$$\mu^{\#} = \frac{\sum |x_i|}{n}$$

The maximum concentration hypothesis in a population of n units partitioned in g groups is: one unit has all the negative wealth and one unit has all the positive wealth, 0 being the wealth of the remaining n – 2 units. The matrix $(n \cdot n)$ of differences in absolute values, in the hypothesis of maximum concentration, will be:

0	X^-	X^-	...	X^-	$X^- + X^+$
X^-	0	0	...	0	X^+
X^-	0	0	...	0	X^+
...	...	...	...	...	...
X^-	0	0	...	0	X^+
$X^- + X^+$	X^+	X^+	...	X^+	0

Hence the mean difference is:

$$\Delta = \frac{\sum_i \sum_j |x_i - x_j|}{n(n-1)} = \frac{2(n-1)X^- + 2(n-1)X^+}{n(n-1)} = \frac{2(X^- + X^+)}{n} = \frac{2\sum_i |x_i|}{n} = 2\mu^{\#}$$

That is twice the mean of the absolute values.

Corollary 1. The generalized Gini index in presence of negative wealth is defined as follows. Following Dagum (1997):

$$G = \frac{\Delta}{\Delta_{\max}}$$

hence:

$$G = \frac{\Delta}{\Delta_{\max}} = \frac{\Delta}{2\mu^{\#}} = \frac{\sum_i \sum_j |x_i - x_j|}{2\mu^{\#} n(n-1)} = \frac{\sum_i \sum_j |x_i - x_j|}{2(n-1)(X^- + X^+)}$$

Note that the above formula encompasses the usual Gini index for null and positive values of wealth.

Now, following Dagum (2006) we consider the decomposition of the Gini index.[5]

Theorem 2. The maximum of the mean difference *within* each group j of a population of n units, partitioned in k groups of n_k units, is:

$$Max(\Delta_{jj}) = \frac{2\sum_{r=1}^{n_j} |x_r|}{n_j} = 2\mu_j^{\#}$$

Proof. The proof is straightforward and can be derived from theorem 1.

Corollary 2. Extending corollary 1, the generalized Gini index *within* each group, in presence of negative wealth, is:

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[5] An alternative way of decomposing the Gini index has been recently proposed by Costa (2016) and by Raffinetti et al. (2016).

$$G_{jj} = \frac{\Delta_{jj}}{\Delta_{jj,\max}} = \frac{\Delta_{jj}}{2\mu_j^{\#}}$$

Theorem 3. The maximum mean difference *between* group j and group z in a population of n units partitioned in k groups of n_k units, is:

$$Max(\Delta_{jz}) = \frac{\sum_{r=1}^{n_j}|x_r|}{n_j} + \frac{\sum_{r=1}^{n_z}|x_r|}{n_z} = \mu_j^{\#} + \mu_z^{\#}$$

Proof. The maximum concentration hypothesis in a population of n units partitioned in k groups of n_k units is the same as that reported in theorem 1, that is one unit has all the negative wealth and one unit has all the positive wealth, 0 being the wealth of the remaining $n-2$ units. Sorting groups by the mean value of wealth, negative value will belong to the first group and positive value to the k-th group. Hence the matrix of the difference in absolute value in the hypothesis of maximum concentration will be a symmetric block matrix as follows:

D_{11}	D_{12}	...	D_{1j}	...	D_{1k}
D_{21}	D_{22}	...	D_{2j}	...	D_{2k}
...	...	...	...	...	...
D_{j1}	D_{j2}	...	D_{jj}.	...	D_{jk}
...	...	...	...	...	...
D_{k1}	D_{k2}	...	D_{kj}.	...	D_{kk}

Remembering the symmetry of the matrix, we have:

1. For $j = 2,...,k-1$, $z = 2,...,k-1$, $D_{jz} = [0]$

2. For $j = 1$, $z = 2,...,k-1$, $D_{jz} = \begin{bmatrix} X^- & X^- & X^- \\ ... & ... & ... \\ 0 & 0 & 0 \end{bmatrix}$ that is n_z

times X^-

3. For $\quad j=2,...,\,k-1,\quad z=k,\quad D_{jz}=\begin{bmatrix} 0 & 0 & X^+ \\ ... & & ... & X^+ \\ 0 & 0 & X^+ \end{bmatrix}$ that is n_j times

X^+

4. For $\quad j=1,\quad z=k,\quad D_{jz}=\begin{bmatrix} X^- & X^- & X^- + X^+ \\ 0 & ... & X^+ \\ 0 & ... & X^+ \end{bmatrix}$

Hence:

1. $\Delta_{jk}=0,\quad j=2,...,k-1,\quad z=2,...,k-1$

2. $\Delta_{jz}=\dfrac{n_z X^-}{n_j n_z}=\dfrac{X^-}{n_j}=\mu_j^{\#}+\mu_z^{\#},\quad j=1,\quad z=2,...,k-1,\quad \mu_z^{\#}=0$

3. $\Delta_{jz}=\dfrac{n_j X^+}{n_j n_z}=\dfrac{X^+}{n_z}=\mu_j^{\#}+\mu_z^{\#},\quad j=2,...,k-1,\quad z=k,\quad \mu_j^{\#}=0$

4. $\Delta_{jz}=\dfrac{n_j X^+ n_z X^-}{n_j n_z}=\dfrac{n_j X^+}{n_j n_z}+\dfrac{n_z X^-}{n_j n_z}=\dfrac{X^+}{n_z}+\dfrac{X^-}{n_j}=\mu_j^{\#}+\mu_z^{\#},\quad j=1,\quad z=k$

Hence, $\max(\Delta_{jz})=\mu_j^{\#}+\mu_z^{\#}\quad \forall j,z$

Corollary 3. The "gross" between Gini index will be:

$$G_{jz}=\frac{\Delta_{jz}}{\Delta_{jz,\max}}=\frac{\Delta_{jj}}{\mu_j^{\#}+\mu_z^{\#}}$$

It is obvious that, in the hypothesized maximizing scheme, the gross and net Gini indexes are identical, the transvariation between

groups by construction being equal to 0. The re-formulation of the net between Gini index and transvariation index is straightforward, each of them being based on a re-weighing of the gross indices.

4. Results

Our focus variable is *WNet*, as defined in section 2. As we have shown in previous papers on the distribution of wealth in Italy (Drudi and Tassinari, 2014; 2015), the rate of growth of *WNet* at current prices is greater than the rate of growth of the consumer price index, so we can say that real accumulation of wealth has increased during the sample period. Total net wealth increased by 41.5% during the period under observation. More interestingly, this growth is smaller than the one detected according to the standard definition of household wealth, showing that the increase in house prices has been a driver of wealth growth. Dividing households according to their prevailing income source (which is a proxy for social groups), we obtain the time pattern reproduced in table 1. As shown in table 3, the shares of self-employed and mixed groups make up about 62% of the total *WNet*.

Table 2 – *Shares of total WNet by prevailing source of income (2002-2012)*

	2002	2004	2006	2008	2010	2012
Self-employed	33.4%	40.8%	36.1%	27.6%	30.7%	39.6%
Employees	25.3%	23%	23.1%	24.0%	24%	17%
Retired	12.1%	7.3%	10.8%	10.4%	10.4%	19.6%
Mixed	29.2%	28.9%	30%	34.9%	34.9%	23.8%
Whole sample	100%	100%	100%	100%	100%	100%
WNET **Total**	594.8	668.4	732.4	712.5	811.1	84.1

Source: Bank of Italy, SHIW, various years.
Notes: *WNET* Total values are expressed in billion euros at current prices.

Table 3 – *Average WNet per household by prevailing source of income (2002-2012), thousands euros at current prices*

	2002	**2004**	**2006**	**2008**	**2010**	**2012**
Self-employed	203.8	297.8	327.2	254	299.4	309.3
Employees	46.1	45.7	51.7	58	61.2	49.2
Retired	51.1	56	65	70	78.7	58.9
Mixed	186.8	173.1	264.4	218.8	251.4	218.4
WNET **Total**	74.2	83.4	94.3	89.3	102	103.3

Source: Bank of Italy, SHIW, various years.

Moreover, if we look at the average *WNet* (table 3) we find that for the self-employed group, wealth has grown by 51,7% in the whole period, while for the employees and retired groups the growth has been much smaller, respectively 6,7% and 15,3% (at current prices). It is important to underline that, after its fall in 2008, *WNet* has grown even during the Great Recession, especially for the two high income groups (self-employed and mixed). In other words, despite the deep economic crisis, the process of accumulation of household wealth (according to our definition) by the richest groups went on. This finding is not new and is consistent with the analysis of the distribution of standard wealth in Italy (Drudi and Tassinari, 2015) and in other countries.

Table 4 shows the evolution of the median *WNet* just before (2002-2006) and during the Great Recession in Italy (2007-2012). It is evident that the median *WNet* of the self-employed group, professionals, and entrepreneurs is almost three times the median *WNet* of the employed and retired groups, and twice the net wealth of the mixed income group. The time path of the variable is flat for all groups with the exception of the self-employed, professionals and entrepreneurs, whose wealth has a cyclical profile, combined with an upward trend.

Table 4 – *Median WNet by social group, 2002-2012, thousands of euros at current prices*

	2002	2004	2006	2008	2010	2012
Self-employed	68.5	107.5	75	79.4	89.6	70
Employees	11.5	11.5	11.2	10.1	11	8
Mixed	26.5	28	25	27.6	9.9	75.2
Retired	10.5	12	11.3	12	15	12
Whole sample	13.5	15	13.7	13.1	16	14.4

Source: Bank of Italy, SHIW, various years.

In short, as it will be made clearer with the Gini index decomposition, inequality has been growing for the whole period, both between social groups and within them. A more complete overview of the distribution of net wealth over time can be given by percentiles. To sum up the changes of the distribution of *WNet* over time, we calculate the 80/20 percentiles ratio and the 95/5 ratio (table 5).

Table 5 – *70/30, 80/20, and 90/10 percentile ratios of the WNet distributions, 2002-2012, at current prices*

	70/30 ratio, %	80/20 ratio, %	90/10 ratio, %
2002	7.66	32.7	346
2004	7.79	28.3	408
2006	8.2	32.9	406
2008	8.2	41.2	676.7
2010	9.54	99.8	1,147.5
2012	13.75	63.5	4,379.5

Source: Bank of Italy, SHIW, various years.

As it was expected, the relationships between deciles in this table are uniformly greater than those obtained using the standard version

of household wealth as a reference variable. For the purpose of our argument, it is worth pointing out that all the ratios increase after 2006 (the same pattern has been found by Wolff, 2016, for the United States). Therefore we can confidently affirm that during the Great Recession the concentration of wealth in high-income households has increased. Furthermore, as the time trend of median values by social group shows, when we exclude both the value of the family home from the calculation of household wealth and the value of the remaining mortgage from the calculation of household debt, the value of median wealth is in practice irrelevant (i.e. always below €20,000) for the employees and the retired groups, as well as for the mixed income group (around €30,000).

This suggests that while the concentration of wealth is a factor contributing to income and societal inequality, it is also important to highlight that the absolute levels of wealth are particularly low; so low that half of the households can be considered as not having any wealth, with serious consequences that will be discussed in the conclusion.

4.1 The Gini concentration ratio and its decomposition

Our last observations concern the presence of households with negative wealth in the distribution. As stated in the introduction, the variable that we have constructed leads to a non-negligible number of statistical units with negative wealth (roughly 5% of all sampled units). To proceed to the calculation of the Gini concentration ratio and of its decomposition in accordance with Dagum's approach, we have thus followed the method described in section 3.

The values of the Gini concentration ratio for the whole sample and for each social group (calculating the inequaity within each group) are shown in table 6. We expected higher values in the Gini index for *WNet* compared to the inequality in the distribution of 'standard' wealth, but we must emphasize that the difference is striking (table 6). The difference between concentration ratios obtained using the two variables is marked for the whole period. Moreover, the total

concentration ratios, after a fall between 2006 and 2008, started to grow again for *WNet*, while the trend has been stable for standard wealth.

Empirical studies concerning wealth distribution are relatively recent and few, despite the great success of Piketty's (2014) book. Only in 2006 has the ECB started the integration of national surveys on income and wealth across European countries (European Central Bank, 2016). Anyway, most of the studies addressing wealth distribution (Davies, 2011; Davies et al., 2016, 2008; Dell et al., 2005; Klevmarken, 2006; T. Piketty and Saez, 2003, 2006; Thomas Piketty, 2014; Saez and Zucman, 2014; Turner, 2010; Ward, 2014; Wolff, 2016) stress how wealth concentration in high-income households has increased over the last thirty years.

For what concerns Italy, our calculations on the standard wealth variable give results that are consistent with other studies (Brandolini et al., 2004; Davies, 2011, p. 131). The amount of total household wealth, in nominal value, has increased by about 63% between 2002 and 2012 (from €1,443 to €2,362 billions at nominal prices), but the rate of increase became nearly null after 2008.

It is worth pointing out the different time patterns of Gini decompositions that we observe when comparing the two wealth variables. The within component is fairly stable for *WNet*, while it is growing for standard wealth (table 7). The most important patterns that emerge from the Gini decomposition are, in our opinion, the high values of G_{nb} (net inequality among groups) and the falling time pattern of G_t (inequality by transvariation among groups). Moreover, from the beginning of the Great Recession (2008), we can see a strong decrease of G_t. As G_t can be interpreted as a measure of confoundedness of distributions among groups, we can conclude that social and economic segmentation has been growing during the Great Recession; this complex interplay can be summarized by *WNet*, which we can consider a sufficient statistic.

Table 5 – *Gini index of variable WNet by the household's prevailing income and for the whole sample (2002-2012), at current prices*

	2002	2004	2006	2008	2010	2012
Self-employed	0.708	0.693	0.788	0.732	0.725	0.764
Employees	0.76	0.752	0.774	0.815	0.788	0.789
Mixed	0.794	0.776	0.85	0.812	0.901	0.705
Retired	0.791	0.771	0.796	0.796	0.786	0.764
Whole sample	0.799	0.795	0.827	0.817	0.812	0.809
Standard wealth	*0.33*	*0.293*	*0.356*	*0.457*	*0.509*	*0.594*
Income	*0.357*	*0.356*	*0.345*	*0.342*	*0.348*	*0.36*

Source: Bank of Italy, SHIW, various years.
Note: for income in 2012, the value is taken from United Nations, *World Development Index*, http://hdr.undp.org/en/content/income-gini-coefficient

Table 6 – *Gini index decomposition of wealth and of WNet (2002-2012), current prices*

	Gini Index	*Gini within*	*Gini gross between*	*Gini net between*	*Gini Tansvariation*
Standard wealth					
2002	0.33	0.099	0.23	0.084	0.145
2004	0.292	0.091	0.201	0.086	0.115
2006	0.355	0.112	0.243	0.096	0.147
2008	0.457	0.151	0.306	0.107	0.198
2010	0.509	0.164	0.344	0.123	0.221
2012	0.594	0.211	0.383	0.032	0.351
WNet					
2002	0.799	0.209	0.589	0.296	0.293
2004	0.795	0.203	0.592	0.358	0.234
2006	0.827	0.213	0.614	0.352	0.262
2008	0.817	0.239	0.579	0.265	0.314
2010	0.812	0.228	0.584	0.294	0.29
2012	0.809	0.178	0.631	0.387	0.244

Source: Bank of Italy, SHIW, various years.

It is possible, using Dagum's decomposition of the Gini index, to decompose the inequality due to the transvariation among different groups (G_t), into pairwise inequality (i.e. the values of G_{jh}) for each year, as shown in table 8.

Table 8 – *Pairwise inequality by year (2002-2012)*

	Year 2002					**Year 2004**			
	G1	**G2**	**G3**	**G4**		**G1**	**G2**	**G3**	**G4**
G1	0.00	0.00	0.00	0.00	**G1**	0.00	0.00	0.00	0.00
G2	0.10	0.00	0.00	0.00	**G2**	0.14	0.00	0.00	0.00
G3	0.00	0.04	0.00	0.00	**G3**	0.01	0.02	0.00	0.00
G4	0.11	0.01	0.04	0.00	**G4**	0.14	0.02	0.02	
	Year 2006					**Year 2008**			
	G1	**G2**	**G3**	**G4**		**G1**	**G2**	**G3**	**G4**
G1	0.00	0.00	0.00	0.00	**G1**	0.00	0.00	0.00	0.00
G2	0.13	0.00	0.00	0.00	**G2**	0.09	0.00	0.00	0.00
G3	0.00	0.04	0.00	0.00	**G3**	0.00	0.03	0.00	0.00
G4	0.13	0.03	0.04	0.00	**G4**	0.09	0.02	0.03	0.00
	Year 2010					**Year 2012**			
	G1	**G2**	**G3**	**G4**		**G1**	**G2**	**G3**	**G4**
G1	0.00	0.00	0.00	0.00	**G1**	0.00	0.00	0.00	0.00
G2	0.10	0.00	0.00	0.00	**G2**	0.12	0.00	0.00	0.00
G3	0.00	0.03	0.00	0.00	**G3**	0.01	0.05	0.00	0.00
G4	0.10	0.03	0.03	0.00	**G4**	0.13	0.01	0.06	0.00

Source: Bank of Italy, SHIW, various years.
Notes: G1 stands for self-employed; G2 for employees; G3 for mixed; and G4 for retired.

The order of magnitude of the component is influenced by the value of G_t, the inequality deriving from transvariation. G_t grows regularly between 2002 and 2008, and then starts to decrease, as we noted above. In year 2012 the component G_{jh} is very high between the self-employed and the employees and retired groups, which means

that the two Lorenz curves are 'intertwined', i.e. that there is transvariation in the sense meant by Gini (1916). In the previous years, the values of the 'between' inequality component caused by transvariation are greater, although it must be noted that the highest value is always found in the comparison between the employees and the self-employed groups, and between the self-employed and retired groups, but not between the employees and retired groups, as the transvariation between these groups is relatively low.

5. Summary and conclusions

Although we expected to find higher values of the Gini index for *WNet* compared to inequality in distribution of 'standard' wealth, we must emphasize that the difference is striking, as shown in table 5. At the end of the period, the Gini coefficient of standard wealth distribution is 20 percentage points lower than the Gini coefficient of the *WNet* distribution, and the difference between Gini concentration ratios obtained using the two variables is marked along the whole period. Moreover, after a fall between 2006 and 2008, the total concentration ratios started to grow again for *WNet*, while the trend has been stable for standard wealth. Therefore, the use of *WNet* casts more light on the consequences of the Great Recession in Italy and shows that the process of wealth concentration is still going on and inequality is deepening.

In our analysis the dispersion of wealth within the social groups is stable (the values of G_w are more or less equal during all the sample period) but the social segregation deriving from differences in average wealth among social groups is growing, as is made evident by the fact that inequality among groups has increased.

It seems to us that, considering the process of wealth concentration at least partly as a consequence of the Great Recession, its effects on Italian society may have strong long-term implications. This is because family wealth is slower in its changes than the income variable, as changing the distribution requires considerable fiscal

interventions. Moreover, inequality in the distribution of assets increases income inequality (if the real interest rate is positive) and also harms human capital accumulation, as less wealthy households cannot invest in education. On a long term basis, this also has a negative impact on economic growth because the labor force is less productive.

Given the intergenerational transferability of wealth, a high degree of concentration has an almost permanent impact on other dimensions of social inequality, such as health status or life expectancy. We can think of wealth concentration as a sort of self-sustained engine that moves us towards a more divided, and also more fragile, society (Milanovic, 2016).

As wealth is the key variable in the modern economic process (Piketty, 2014), many paths of research are obviously open. In our opinion it is essential to determine the shares of household wealth that are given by capitalization of savings, by changes in nominal prices of real capital, by financial gains (or losses) and by inheritance. Moreover, it is very important to highlight the links between wealth concentration and economic growth, especially for what concerns human capital accumulation and the process of real investment. Finally, future research should investigate the consequences of the deepening of economic inequality on the patterns of representative democracy.

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