THE DISTRIBUTION OF TOTAL WEALTH IN ITALY: 1991–2002

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We estimate an "augmented" measure of wealth incorporating social security wealth for the first time in Italy, and examine the composition and distribution of such augmented wealth among Italian households during the period 1991–2002. The path followed by augmented wealth from 1991 to 2002 is determined by two opposing forces: namely an increase in net worth and a decline in social security wealth, which appears to be much more pronounced in the first part of the period. Wealth inequality, after rising steeply at the beginning of the 1990s, leveled off during the second part of the period in question. The major contribution toward this upwards movement came from social security wealth, the distribution of which, although less unequal than that of real wealth and financial wealth, widened at a much faster pace at the beginning of the decade.

1. Introduction

The value of annuities expected from the pension system constitutes a major part of total household wealth in all developed countries. Any analysis of the accumulation and distribution of wealth, and of its evolution over time, would therefore be misleading without its inclusion. An "augmented" measure of wealth, defined as the sum of net worth and pension wealth (Davies and Shorrocks, 2000; Wolff, 2005a), should overcome any possible shortcoming. The first component of augmented wealth is net worth, which is equal to the total value of all those assets a household can sell on the market, less any debts. Feldstein (1976) and Wolff (1987) argue that net worth is not a very satisfactory definition of wealth in those countries where there is a mandatory, public pension system. If contributions to a social security scheme are perceived by individuals as a substitute for other forms of lifecycle saving, then a definition of wealth capable of measuring the stock of resources to be used to finance consumption during old age should also take into consideration the present value of future pension entitlements. Jappelli and Modigliani (1998) point out that in any pension scheme, contributions should be regarded as a component of life-cycle savings because they entitle workers to receive a retirement pension in the future. They also point out that pension benefits represent the utilization of pension wealth that was previously accumulated prior to retirement, and should therefore be considered as a de-cumulation of wealth. It is clear that this distinction concerning the measurement of total wealth becomes

increasingly important as the size of the public pension system and its degree of actuarial fairness increase, and is not in any way related to whether or not the system is funded (Lindbeck and Persson, 2003).

In this paper we estimate an "augmented" measure of wealth for Italian households during the period 1991–2002, and we analyze its distributive profile over the same period. "Augmented" or total household wealth is defined as the sum of net worth (namely the total market value of dwellings, consumer durables, and financial assets, net of debts) and social security wealth. Several important events that took place during this decade have rendered the distributive analysis of this measure of particular interest, namely: (i) three structural reforms of the public pension system (in 1992, 1995, and 1997), which nearly halved the aggregate value of social security wealth (this reduction was of an uneven nature, affecting diverse cohorts and productive categories within Italian society to different degrees); (ii) a substantial shift in the distribution of financial assets among Italian households over the course of the decade, which resulted in their increased concentration compared with the previous decade; and (iii) the steady growth in the real component of wealth, and in particular real estate, from 1992 onwards.

While the distributive effects of (ii) and (iii) have been empirically analyzed (Jappelli and Pistaferri, 2000; Brandolini *et al.*, 2006) no one, as far as we know, has empirically tested the effects on wealth distribution of those events described in (i). Using adjusted data taken from the Bank of Italy's "Survey of Household Income and Wealth" (SHIW) for the period 1991–2002, we first estimate a comprehensive measure of household wealth which also includes social security wealth, and we then analyze the distributive properties of this "augmented" measure and its trend.

Empirical research into the effects of the pension system on wealth distribution has been mainly carried out in the U.S. Such research concludes that social security wealth has a clearly mitigating effect on the distribution of total wealth, whereas the effect of private pension wealth is perceived as being of a less uniform nature. Feldstein (1976), Wolff (1987, 2005a, 2005b), McGarry and Davenport (1997), and Kennickell and Sunden (1999) provide estimations of the distributive effects of pension wealth in the U.S. All of these studies define the total wealth of each household as the sum of net financial and real assets plus private pensions and social security wealth. Feldstein (1976) finds that total wealth in the U.S. is concentrated to a far less degree after social security wealth has been taken account of. The Gini coefficient for net worth is 0.72, whereas for total wealth it is down to 0.51. Moreover, the distribution of total wealth among different income classes is closer to the distribution of social security wealth than it is to that of net worth. Wolff (1987) shows that social security wealth has a pronounced equalizing effect on the distribution of total wealth. He simulates the lifetime wealth distribution of the U.S. population, and finds that the inclusion of social security wealth produces a marked reduction in measured wealth inequality. The Gini coefficient decreases from 0.73 to between 0.49 and 0.60. This reduction in inequality can be explained by the fact that social security wealth is much more evenly distributed than disposable wealth, and its magnitude is very close to that of traditional household wealth. Kennickell and Sunden (1999) also find that social security wealth constitutes a substantial part of total wealth, and its introduction has had an equalizing

effect on U.S. wealth distribution. In particular, they show that the bottom 90 percent of the population hold an overwhelming proportion of social security wealth, whereas the top 0.5 percent own 45 percent of business assets and 30 percent of traded corporate stocks. Gustman *et al.* (1997) estimate that private pensions, social security wealth, and health insurance together account for half of all wealth held by those households with an average age of between 51 and 61. Wolff (2005b) estimates distributive trends for various measures of wealth, and these trends show that the inclusion of social security wealth results in a marked reduction in the Gini coefficient for total wealth, from 0.826 to 0.665, in 2001. This reflects both the lower level of inequality in social security wealth than in other components of wealth, and its relatively low correlation to net worth. The same study reveals that over a 19-year period (1983–2001) there was a decline in the equalizing effect of social security wealth. An augmented measure of wealth has been also estimated for both Canada (Shamsuddin, 2001) and the U.K. (Banks *et al.*, 2005). The latter study provides a detailed reconstruction of the said variable for people aged between 50 and the state-pension age for the U.K. Banks *et al.* (2005) find that social security wealth is more equally distributed than private pension wealth. Moreover, according to their estimation, pension wealth and non-pension wealth do not act as substitutes for each other. Finally the composition of total wealth varies considerably across wealth distribution.

Although social security wealth has been estimated for Italy, to our knowledge nobody has analyzed its distributive properties.[1] Furthermore, there are relatively few empirical studies of net worth distribution in Italy (Cannari and D'Alessio, 1994; Jappelli and Pistaferri, 2000; Brandolini *et al.*, 2006). Cannari and D'Alessio (1994) examine household wealth inequality using the 1991 SHIW, and show that at the beginning of the1990s, the proportion of net worth held by the richest decile amounted to 39 percent, while the corresponding figure for the poorest decile was a mere 0.2 percent. Using data drawn from four cross-sections (1989, 1991, 1993, and 1995) of the SHIW, Jappelli and Pistaferri (2000) portrayed the static and dynamic features of wealth distribution, and compared them with consumption and income inequality: they discovered that wealth distributions are substantially more right-skewed and dispersed than are the corresponding distributions of consumption and disposable income: net worth and financial wealth displayed Gini indexes of 0.59 and 0.70, respectively, in 1995, as opposed to scores of 0.30 and 0.36 for consumption and disposable income. Examining wealth distribution by income deciles, they also discovered that both mean and median wealth monotonically increase with the household's ranking in the income distribution table, thus implying a strong correlation between the relative positions of the two distributions. Using the SHIW historical archive, Brandolini *et al.* (2006) have investigated the composition and distribution of wealth among Italian households, together with its evolution from 1989 to 2000. They estimate an adjusted

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[1]The degree of substitutability between social security wealth and private wealth has been tested in a number of analyses designed to verify the validity of the life-cycle hypothesis (Attanasio and Brugiavini, 2003). Social security wealth estimates have also been widely employed in political and economic debate in order to gauge the sustainability of the public pension system, the long-term effects of the Italian pay-as-you-go system on public finance (Sartor, 1999), and the effects of pension rules on labor supply decisions (Brugiavini and Peracchi, 2003).

measure of net worth which starts from the row data, and tries to adjust the distortions resulting from non-reporting and non-response. They find that wealth distribution is a lot more unequal than income distribution is: in 2000, the Gini index was 0.61 for net worth, compared with 0.37 for disposable income. The corresponding values of the Gini index for the main components of net worth were 0.60 for real assets, and a much higher 0.81 for financial assets. Wealth inequality declined from 1989 to 1991, before rising considerably during the rest of the decade, due mainly to the large gains made at the very top of the distribution. A substantial part of the increase in net worth inequality was traceable to financial assets, which have gained in importance vis-à-vis other assets, and have become concentrated to an even greater degree.

Starting from the results obtained by Brandolini *et al.* (2006), this paper aims to ascertain whether social security wealth has a similar equalizing effect on the distribution of wealth in Italy as it has been estimated to have in other developed countries, and to estimate the distributive implications of the reforms of the Italian public pension system implemented during the 1990s. The reform process started in 1992 with the Amato reform, a standard parametric reform which increased legal retirement age, cut accrual factors in the pension formula, and modified indexation of pension benefits, linking their nominal growth to inflation instead of to wages. The 1995 reform introduced a notional defined contribution system, linking more closely contributions and pension benefits at the individual level and crediting future benefits a sustainable rate of return. Finally, the 1997 reform further reduced the heterogeneity of treatments between private and public employees and restricted the possibility to retire before the legal retirement age.[2]

According to a number of studies (see, among others, Castellino and Fornero, 2001; Franco, 2002), the change from a defined benefit to a (notional) defined contribution scheme resulting from the 1995 reform, should have made the system more equitable by linking closely contributions and pension benefits at the individual level. Contributions are (fictitiously) accumulated in an individual fund and are revalued in line with a moving average of GDP growth. Pension benefits are calculated as a product of this revaluation and a conversion coefficient conditional on life expectancies at retirement. From a distributive point of view such a formula should provide a homogeneous internal rate of return across pensioners.

However, the very slow transitional path from the earnings related formula existing before 1995 to the reformed one (a contributions related formula) complicates the picture. In fact, all individuals with at least 18 years of contributions in 1995 remained under the old earnings related scheme, while workers with less than 18 years of contributions will retire with a weighted mixture of pre- and post-reform benefits. Moreover, the decision, already made in 1992, to abandon the indexation of pension benefits to real wages will result in the gradual impoverishment of existing pensioners compared with new pensioners and workers. So for the next decades the Italian social security system will pay pension benefits computed under three different set of rules and at the same time such benefits will decrease their relative value depending on their maturity.

[2]For a comprehensive description and discussion of the reform process, see Franco (2002). A summary description of the main changes intervened in the computation of pension benefits, in the level of payroll taxes, and in the legal retirement age is presented in Appendix 2 (Table A4).

By computing the evolution over time of a number of relative inequality indices on total wealth, net worth, and social security wealth, we estimate the distributive implications of public pension reforms carried out during the 1990s. In particular, we evaluate the effects of the slow transition from the earnings related formula existing before 1995 to the new one (a contributions related formula) on the distribution of social security wealth and, consequently, on total wealth inequality. To understand how the distributions of net worth and social security wealth combine to produce the overall degrees of inequality, we resort to the decomposition of the Gini index.

The paper is organized as follows. Section 2 describes the nature of the data and the estimation of social security wealth. Section 3 offers microeconomic evidence of the composition and inequality of total wealth in Italy during the period 1991–2002. The impact of pension reforms on social security wealth distribution by age class is examined in Section 4. Section 5 concludes.

2. Data Sources and the Accounting Framework

The data used in this study are taken from the historical archive of the SHIW for the years 1991, 1993, 1995, 1998, 2000, and 2002. The sample size is about 8,000 units per year.[3] The survey gathers information on household microeconomic behavior and on the socio-demographic characteristics of household members. The basic unit of observation is the "household," defined as all persons related by blood, marriage, or affection, residing under the same roof and pooling all or part of their incomes. No account is taken in this paper for household size or composition: in other words, no equivalence scale is used.[4]

The definition of "augmented" or total wealth, TW, at time t can be summarized as follows:

$$(1) \qquad TW_t = AR_t + AF_t - PF_t + SSW_t$$

where: AR is the sum of consumer durables, jewelry and other valuables, real estate, and businesses; AF is the sum of all financial assets; PF measures all debts; and SSW is social security wealth.

Our definition of total wealth does not include severance indemnity and the cash value of life insurance and private retirement accounts, which are not recorded in our data source.[5] Comparisons with external sources, such as national accounts, show that the wealth estimates contained in the SHIW are under-

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[3]We do not exclude any observation from the initial sample.

[4]Some researchers have on occasion used equivalence scales in wealth studies: see, for example, Burkhauser and Weathers (2001), who discovered that ignoring household size overstates the share of single-member households in the bottom wealth decile. Although we are aware that not using any equivalence scale might affect the results, our choice of not using any scale follows from the fact that in the wealth distribution literature there is no standard or well-defined approach to accounting for different needs as represented, for instance, by the size of the household. See Sierminska and Smeeding (2005) for a careful discussion of the equivalence scale question in wealth studies.

[5]Original data from SHIW do contain information about the average amount of cash held by each household. However, as this information is collected separately from other information on household wealth, we decided not to take account of this variable (as other studies using the same dataset have also done), which amounts to around 0.3 percent of total net worth.

reported, particularly in the case of financial assets. The discrepancies between aggregate and survey data can be accounted for by several factors: firstly, by the existence of irreconcilable differences in classifications and definitions, which prevent micro and macro data from being fully comparable; secondly, by the difficulty of including, in a statistically representative way, the wealthiest households in the sample (selection bias), given that wealth distribution is highly concentrated; and thirdly, by interviewees' reticence to reveal the assets they actually own (non-reporting) or their tendency to under-value their declared asset holdings (under-reporting). A range of statistical techniques have been adopted to adjust for the likelihood of non-response to questionnaires, and for that of non-reporting or under-reporting of both financial assets and dwellings not occupied by their owners, in the SHIW. A description of the procedures which have been followed in order to adjust the data, as well as some of the results obtained using unadjusted data, are reported in Appendix 1.

2.1. *The Calculation of Social Security Wealth*

Social security wealth is defined as the discounted sum of all expected future pension benefits, less the discounted sum of contributions an individual expects to pay between the time of observation and his/her retirement.[6] In order to calculate this variable, we firstly split the sample between those individuals who, having not yet reached retirement age, are still present in the labor market, and those individuals who already receive a public pension in the year of observation.[7]

For each employed individual i observed at time t we have:

$$(2) \qquad SSW_{i,t}^E = \left[(1+r)^{(t-p)} \sum_{k=p}^{p+d} (1+r)^{(p-k)} B_i (1+g)^{(k-p)} - \sum_{k=t}^{p-1} c_k W_{k,i} (1+r)^{(t-k)} \right]$$

where p is the expected year of retirement of individual i, d is the life expectancy at retirement of individual i, B_i is the pension benefit expected by individual i upon retirement, r is the discount rate, g is the real annual growth of the pension benefit, c_k is the payroll tax rate at year k, and $W_{k,i}$ is the gross wage of individual i at year k.

For the retired, the SHIW contains information about the level of pension benefits. Their social security wealth is computed according to the following equation:

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[6]The definition of social security wealth used in this paper is not the only one present in economic studies: one alternative definition sees social security wealth as the accrued (present) value of future streams of pension benefits. Two reasons led us to adopt the definition of SSW reported in the text: (i) while the accrued-to-date definition is appropriate for a defined contribution system, it is more complicated in the case of the defined benefit scheme which still regards the majority of current and future pensioners in Italy; and (ii) we implicitly adopt the hypothesis that retirement savings are the equivalent of a compulsory saving plan.

[7]We do not compute social security wealth for individuals that in the year of observation are unemployed and/or out of the labor force. This choice implies a likely underestimation of social security wealth.

$$(3) \qquad SSW_{i,t}^{R} = \left[\sum_{k=t}^{a+d} (1+r)^{(t-k)} B_i (1+g)^{(k-t)} \right]$$

where a is the life expectancy of individual i at time t, and B_i is derived from the SHIW dataset. A detailed description of all the hypotheses and the procedure used to estimate variables and parameters reported in equations (2) and (3) is reported in Appendix 2.

Since figures for other forms of wealth are collected in the SHIW at the household level, we need to sum up social security wealth computed at time t for each household. Therefore, social security wealth for each household h at time t is:

$$(4) \qquad SSW_{h,t} = \sum_{i=1}^{N} SSW_{i,t}^{E} + \sum_{i=1}^{M} SSW_{i,t}^{R}$$

where N and M are the maximum number of employed and retired individuals, respectively, living in household h.

3. The Composition and Inequality of Total Household Wealth: Microeconomic Evidence

This section presents a series of estimates of the composition and distribution of total wealth in Italy during the period 1991–2002. Median total wealth of an Italian household was about 14 percent lower in 2002 than in 1991, as the first row in Table 1 shows. The decline in real terms was not a continuous one. After falling by 20 percent between 1991 and 1995, median total wealth rose by 8.3 percent from 1995 to 2002. Mean total wealth was higher than the median, and it experienced a much less pronounced variation during the course of the decade. In fact, after falling by nearly 10 percent between 1991 and 1995, mean total wealth went back to its original levels by the end of the 1990s. In 2002, mean total wealth was 5.8 percent higher than it had been in 1991.[8]

The time trend for median total wealth is the product of two opposing tendencies: the rise in net worth, largely attributable to the increase in home-ownership and dwelling size, the rise in house prices, the substantial shift in household portfolios toward higher-risk assets, and the remarkable increase in stock market prices during the late 1990s (Brandolini *et al.*, 2006), is almost completely counterbalanced by the reduction in social security wealth, which appears to be mainly concentrated during the period between 1991 and 1995,

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[8]A feature of wealth distributions, also shared with income distributions, is that there is a non-trivial prevalence of extreme values. In order to explore the sensitivity of our estimates to their exclusion, we tested how much extreme observations influence the evolution over time of mean values. If one trims the richest 1 percent and poorest 1 percent of the distributions, the estimated increase in total wealth mean during the period 1991–2002 is 1.5 percent rather than 5.8 percent. As far as the two components on total wealth are concerned, the estimated increase in the trimmed mean of net worth (i.e. real and financial assets) during the same period is 20.8 percent rather than 28 percent, while the reduction in the trimmed mean of social security wealth is 20.6 percent rather than 19.6 percent. Apparently, the tails of net worth distribution are longer than their counterparts for social security wealth distribution.

TABLE 1

MEAN AND MEDIAN HOUSEHOLD WEALTH, 1991–2002 (AT 2002 PRICES IN THOUSANDS OF EURO)

	1991	1993	1995	1998	2000	2002	% Change 1991–2002
Total wealth							
Median	324.9	271.7	259.2	260.1	265.8	280.7	−13.6
Mean	416.5	380.4	375.2	414.1	434.3	440.7	5.8
Percent with zero or negative values	0.0	0.9	2.2	2.0	2.3	2.3	
*Real and financial assets**							
Median	134.0	140.3	134.2	129.6	135.4	143.6	7.2
Mean	222.3	242.2	239.4	270.4	284.8	284.5	28.0
Percent with zero or negative values	0.5	1.9	1.8	1.7	1.6	1.5	
Social security wealth							
Median	166.1	105.2	92.9	99.1	102.3	111.9	−32.6
Mean	194.2	138.2	135.7	143.7	149.5	156.2	−19.6
Percent with zero or negative values	13.1	16.7	19.5	18.7	17.8	17.6	
*Disposable income***							
Median	23.0	21.3	21.8	24.0	23.6	23.3	1.3
Mean	26.9	26.1	26.7	28.6	28.7	28.3	5.2

Notes: Median and mean values are expressed at 2002 prices calculated using the consumer price index.

*Net of financial liabilities.

**Total household income net of taxes and social security contributions.

Source: Authors' calculations from SHIW-HA figures.

which in turn may be explained in terms of the effects of the two public pension system reforms introduced in 1992 and 1995.

The abolition of the indexation of pensions to real wage growth in 1992, involving all current and future pensioners, together with changes in the computation of pension benefits,[9] that reduced the replacement rate between pension benefits and final wage,[10] chiefly affected young workers and the self-employed. Such changes tended to reduce the present value of future pension benefits to a degree that has more than counterbalanced the opposite effect induced by the increase in contributions and the raising of retirement age. Due to its sharp fall, social security wealth, which in 1991 accounted for almost half of Italian households' wealth, represented only one third of total wealth by the beginning of the current decade. After 1995, there was a partial recovery in the median and mean values of social security wealth. This may be the result of the higher seniority at retirement and earnings of workers who retired during the1990s.[11] Such factors,

[9]For a technical description of such changes, see Appendix 2 (Table A4).

[10]According to a study of the European Commission (2006), the theoretical gross of personal income tax replacement rate for a full time worker with a 40 year career length, a retirement age of 65, and an average earning is expected to decrease from 78.9 percent in 2004 to 70.7 percent in 2030 and to 64.1 percent in 2050. A lower retirement age, a higher than the average earnings dynamic, a shorter seniority at retirement, and a discontinuous earning career are factors that make these figures worse.

[11]The higher number of years of contributions for those individuals retiring after 1991 depends mainly on the fact that pension schemes for the self-employed have only recently reached maturity after their initial introduction in Italy during the1960s.

TABLE 2

Distribution of Household Wealth, 1991–2002

Year	Percentage Share of Total Wealth and its Components Held by the:					
	Top 1%	Next 9%	Top 20%	2nd 20%	3rd 20%	Bottom 40%
Total wealth						
1991	6.5	24.2	46.9	24.6	15.5	13.0
1993	8.0	25.7	50.0	22.9	15.3	11.8
1995	8.5	25.7	51.4	22.6	15.0	10.9
1998	13.4	26.8	56.1	19.8	13.5	10.7
2000	13.8	26.6	55.6	20.5	13.4	10.5
2002	10.6	28.8	55.5	20.3	14.0	10.2
Real and financial assets						
1991	9.6	28.7	54.5	22.6	12.9	10.0
1993	10.8	29.0	56.2	21.2	13.2	9.5
1995	11.3	28.6	56.5	20.3	13.2	10.0
1998	18.9	29.3	63.0	16.5	11.2	9.3
2000	19.6	29.2	62.6	17.2	11.3	9.0
2002	14.9	31.5	61.6	17.6	11.8	9.1
Social security wealth						
1991	2.9	19.1	38.2	26.8	18.6	16.4
1993	3.0	20.0	39.2	26.0	19.0	15.7
1995	3.5	20.5	42.4	26.7	18.3	12.6
1998	3.2	22.1	43.2	25.9	17.7	13.2
2000	2.6	21.8	42.4	26.8	17.5	13.3
2002	2.8	23.8	44.3	25.3	18.1	12.3

Source: Authors' calculations from SHIW-HA figures. In order to calculate percentile shares, households were ranked according to their total wealth.

together with the slow transitional path taken by the reform, resulted in a higher than average level of new pension benefits compared with the existing one.

Table 2 gives a detailed breakdown of wealth distribution by various different percentiles. In 2002, the top 1 percent of all families owned 10.6 percent of total household wealth; the top 20 percent of households held 55.5 percent. Focusing on the two components of total wealth, we estimate that the richest quintile owned 61 percent of all real and financial assets, and 44.3 percent of overall social security wealth.

The figures show that total wealth inequality, while rising steeply at the beginning of the 1990s, substantially leveled off during the second half of the decade. For example, the share of total wealth held by the top 1 percent rose from an initial figure of 6.5 percent in 1991 to 8.5 percent in 1995, before remaining stable at around 13–14 percent for the rest of the decade and then falling to 10.6 percent in 2002. The share of total wealth held by the richest quintile followed a monotonically upward trend, rising from 46.9 percent in 1991 to 55.5 percent in 2002. At the other extreme of the distribution range, the share of total wealth held by the bottom two quintiles fell substantially, from 13.0 percent in 1991 to 10.2 percent at the end of the period in question.

A similar trend characterized the inequality in the distribution of real and financial assets. For example, the share held by the top 1 percent grew from an initial 9.6 percent to 19.6 percent in 2000, before falling to 14.9 percent in 2002. This trend is probably due to the strong increase in stock market prices during the

late 1990s and the subsequent fall at the beginning of this decade, which initially benefited the richest percentile, but then damaged it.

Not surprisingly and consistently with Usa's studies mentioned above, since social security wealth is correlated with the lifetime distribution of earnings, it appears concentrated to a lesser degree than real and financial wealth are. At the beginning of the 1990s, the share of social security wealth held by the top 1 percent "only" amounted to 2.9 percent, whereas their share of real and financial wealth stood at 9.6 percent.

The pension reforms implemented in the 1990s seem to have reduced the equalizing effect of social security wealth on total wealth. In fact, the percentage of social security wealth accruing to the bottom 40 percent of the distribution fell, from 16.4 to 12.3 percent. This may be due to the increasing number of young workers, the worse hit by the reforms, for whom social security wealth became negative after the restrictive pension reforms introduced in 1992 and 1995.[12]

Figures 1a–c illustrate the changes in the distribution of total wealth and its components during the period between 1991 and 2002.[13] Figure 1a shows percentage changes in total wealth, which are negative for the majority of people, rising monotonically with the percentile level, from around −80 percent at the 5th percentile to 26% at the 95th percentile. The crossover point occurs at the 65th percentile, with those households above this point enjoying gains, and those at or below the said point suffering losses.

The pattern of distributional changes in total wealth between 1991 and 2002 is the product of the changes in the distributions of net worth and social security wealth. The distributional pattern with regard to net worth (see Figure 1b) shows percentage losses for the first quintile and percentage gains from the 20th percentile onwards: while the percentage increase remains relatively flat—at around 17 percent—between the 35th and 85th percentile, it rises to a peak of 32 percent at the 95th percentile. It is interesting to note that unlike in the case of total wealth, the crossover point for net worth occurs quite close to the left tail of the distribution, at around the 20th percentile.

Figure 1c depicts the changes in the distribution of social security wealth between 1991 and 2002. The pattern is quite a dramatic one, with percentage losses for all percentiles except for the 95th. These losses imply negative values of social security wealth in 2002 for the households up to the 10th percentile, and zero values for those within the second decile. Percentage losses for the remaining part of the distribution decrease monotonically with the percentile level, from around 60 percent at the 25th percentile to 10 percent at the 75th percentile.

[12]A negative value for the net social security wealth for young individuals is due to the fact that the internal rate of return of the program (which has been assumed to be roughly 1.5 percent, that is the expected rate of growth of GDP for the next decades, in our base simulation for individuals who belong to the notional defined contribution system) is lower than the discount rate used to compute the present value of future contributions and benefits (2 percent in our base case). It is well known that, from an intergenerational point of view, this is equivalent to say that individuals with a negative value in their social security wealth are incurring a loss because they receive a return on their contributions that is less than the return they would earn by investing those funds in the capital stock (Feldstein and Liebman, 2002).

[13]Figures 1a–c exclude the two tails of the distributions (the 5 percent poorest and the 5 percent richest) in order to highlight the extent of the differences in total wealth and its components for the remaining part of the population.
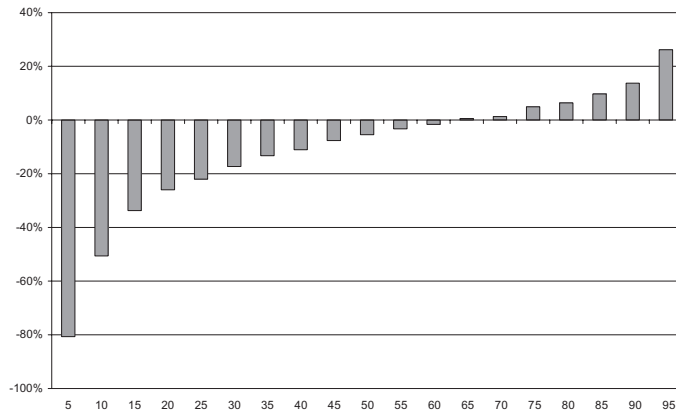
Figure 1a. Percentage Growth in Total Wealth (in 2002 Euro); All Households, by Percentile, Between 1991 and 2002
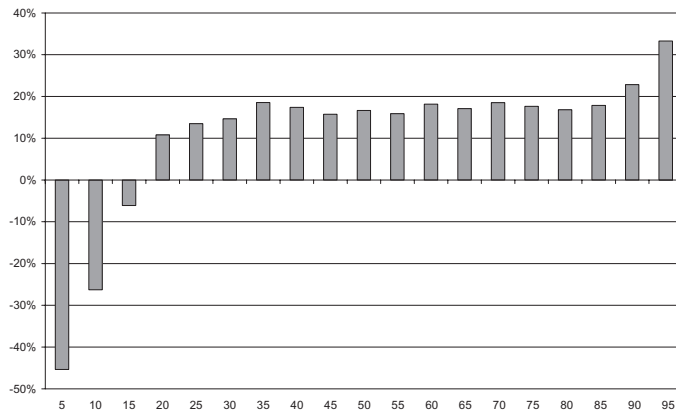

Figure 1b. Percentage Growth in Net Worth (in 2002 Euro); All Households, by Percentile, Between 1991 and 2002
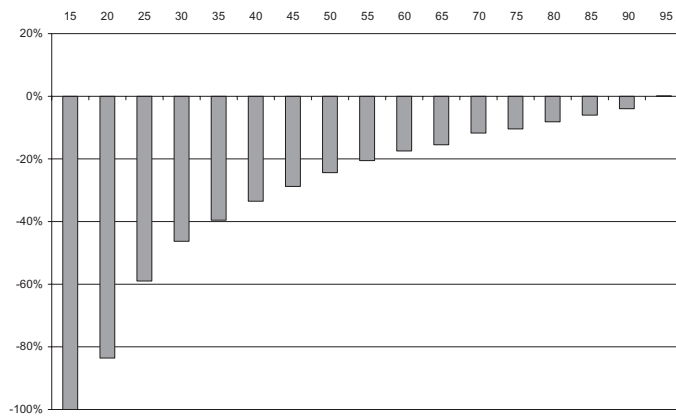

Figure 1c. Percentage Growth in Social Security Wealth (in 2002 Euro); All Households, by Percentile, Between 1991 and 2002

TABLE 3

THE GINI INDEX OF TOTAL HOUSEHOLD WEALTH, ITS COMPONENTS, AND THE GINI INDEX OF
DISPOSABLE INCOME

	1991	1993	1995	1998	2000	2002
Total wealth	43.3	49.2	51.2	55.7	56.0	54.4
	(0.006)	(0.005)	(0.006)	(0.010)	(0.011)	(0.007)
*Real and financial assets**	56.6	59.2	59.7	65.4	65.5	63.0
	(0.007)	(0.007)	(0.007)	(0.013)	(0.012)	(0.008)
Real assets	60.9	63.0	61.9	63.4	62.3	62.0
	(0.008)	(0.007)	(0.006)	(0.008)	(0.008)	(0.009)
Financial assets	67.4	69.7	72.9	80.9	82.8	79.0
	(0.010)	(0.009)	(0.008)	(0.014)	(0.013)	(0.010)
Financial liabilities	92.5	91.9	91.6	93.0	93.3	92.4
	(0.013)	(0.015)	(0.012)	(0.013)	(0.011)	(0.010)
Social security wealth	44.9	52.2	57.6	58.2	57.6	57.2
	(0.005)	(0.005)	(0.005)	(0.007)	(0.006)	(0.005)
*Disposable income***	32.4	35.1	35.8	38.8	35.6	33.1
	(0.007)	(0.005)	(0.006)	(0.007)	(0.006)	(0.008)

Notes:
*Net of financial liabilities.
**Total household income net of taxes and social security contributions.
Source: Authors' calculations from SHIW-HA figures. Asymptotic standard errors in parentheses.

Table 3 shows the Gini index for total household wealth and its various components. There was a substantial rise in total wealth inequality, from 43.3 percent in 1991 to 56 percent in 2000, followed by a slight downwards shift in 2002.[14] The major contributory factor in this upwards trend proved to be social security wealth, the distribution of which broadened during the early part of the decade at a much faster pace than that of real and financial assets. In fact, the Gini index for social security wealth rose by around 14 percentage points, from 44.9 percent in 1991 to 58.2 percent in 1998. It decreased slightly thereafter up until 2002. Net worth, as expressed by the Gini index, witnessed a less substantial increase, even though the dynamic of the financial component displays a remarkable increase of 12 percentage points. Table 3 also shows the trend in disposable income inequality. It is interesting to note that the income trend partially differs from the trend displayed by wealth. In fact, after rising steeply between 1991 and 1998, from 32.4 percent to 38.8 percent, at the end of the period in question disposable income inequality returned to values (33.1 percent in 2002) which were not much higher than the initial ones.

Lorenz curves for Italian total wealth, net worth, and social security wealth are shown in Figures 2a–b. The comparison of Lorenz curves for total wealth, net worth and social security wealth, at the beginning and at the end of the period, suggests that wealth inequality clearly increased between 1991 and 2002: in fact,

[14]In order to see whether our inequality estimates are sensitive to the inclusion of extreme observations, we recalculated the Gini indexes for 1991 and 2002, excluding the top and bottom percentile groups. Removing the top and bottom 1 percent of the distributions, the estimated Ginis for total wealth were 40.1 percent for 1991 and 50.0 percent for 2002, implying a relative increase in the index of only 24.7 percent (compared to 25.6 percent when all observations are included in the estimate). It is interesting to note that trimming the top and bottom percentiles had less impact on the inequality estimates of social security wealth than on the inequality estimates of net worth.
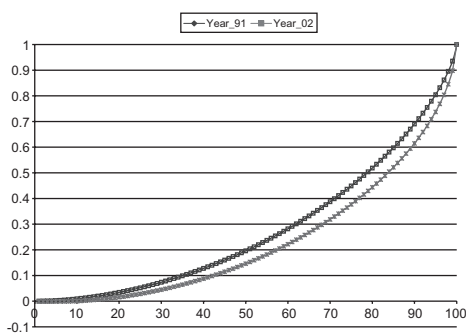
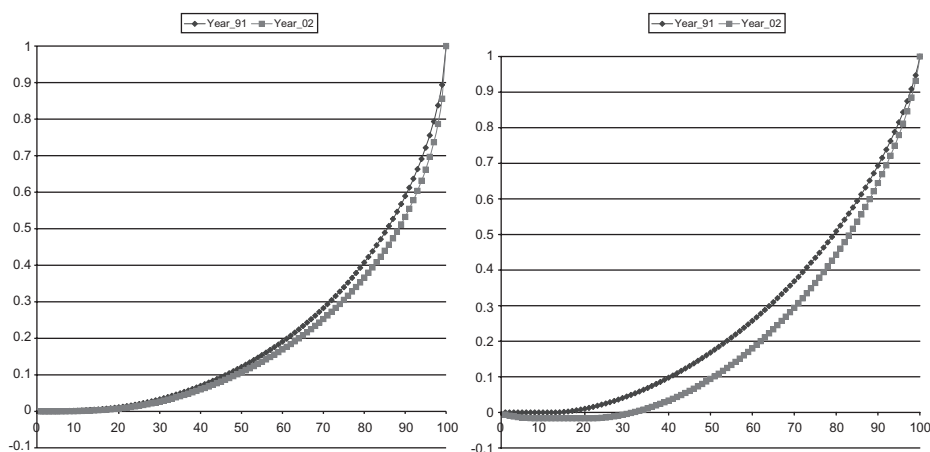Figure 2a. Lorenz Curve for Total Wealth; 1991 and 2002

Figure 2b. Lorenz Curves for Net Worth and Social Security Wealth; 1991 and 2002

the two curves for each definition of wealth do not intersect. It may therefore be argued that the same inequality ordering is confirmed not only by a comparison in terms of Gini indices, as previously shown in Table 3, but also by all standard relative inequality indices, namely all measures satisfying anonymity, scale independence, the strong principle of transfers, and population replication (Atkinson, 1970; Foster, 1985).[15]

[15]As far as our Lorenz curve comparison is concerned, it is interesting to note that the curves are of a non-standard shape. In fact, even though the mean value of each definition of wealth (total wealth, net worth, and social security wealth) is positive, the wealth held by the poorest households is sometimes zero or negative: therefore the Lorenz curve has a negative slope, lying below the horizontal axis, over the ranges of negative wealth values, and is horizontal, in correspondence to the population subgroup that has zero wealth. In particular, the 2002 and 1991 Lorenz curves for social security wealth hang beneath the horizontal axis up to the poorest 17 percent and 6 percent of the population, respectively. The same applies for the 2002 Lorenz curve for total wealth, which hangs beneath the horizontal axis up to the poorest 10 percent of the population. See Jenkins and Jäntti (2005) for a review of the distinctive features of wealth distributions that make empirical analysis non-standard in several ways (due to zero and negative wealth values, non-trivial prevalence of extreme values, etc.).

TABLE 4

DECOMPOSITION OF THE INEQUALITY OF TOTAL WEALTH, 1991 AND 2002 (PERCENTAGE VALUES)

	Decomposition of the Gini Index				
	Share of Total Wealth (a)	Gini Index (b)	Rank Correlation (c)	Absolute Contribution (a)*(b)*(c)	Relative Contribution (a)*(b)*(c) (%)
1991					
Real assets	0.37	0.61	0.84	0.19	43.6
Financial assets	0.17	0.67	0.73	0.08	19.2
Financial liabilities	−0.01	0.93	0.26	−0.002	−0.40
Social security wealth	0.47	0.45	0.78	0.16	37.6
Total wealth	1.00	0.43	—	0.43	100.0
2002					
Real assets	0.44	0.62	0.86	0.23	43.2
Financial assets	0.22	0.79	0.84	0.15	26.9
Financial liabilities	−0.01	0.92	0.15	−0.001	−0.30
Social security wealth	0.35	0.57	0.80	0.16	30.1
Total wealth	1.00	0.54	—	0.54	100.0

Note: Since the Gini index is not precisely decomposable, the value obtained by decomposition may differ from the one shown in the last row of column (b).
Source: Authors' calculations from SHIW-HA figures.

In order to evaluate the role played by the various components of total wealth on its overall variability, we computed a decomposition of the Gini index, as in Pyatt *et al.* (1980). The Gini index $G(w)$ of total wealth TW can be expressed as follows:

$$(5) \qquad G(TW) = \sum_{k=1}^{4} \left(\frac{w_k}{w} \right) G(w_k) R(w, w_k)$$

where w_k represents the components of total wealth (real assets, financial assets, financial liabilities, and social security wealth), $G(w_k)$ represents the Gini index for the k component, and $R(w, w_k)$ is the correlation coefficient among ranks:

$$(6) \qquad R(w, w_k) = \frac{\text{cov}(w_k, r(w))}{\text{cov}(w_k, r(w_k))}$$

where cov( ) is the covariance between the k component of total wealth and $r(x)$, which shows the ranking of households according to w and w_k. Results of the Gini decomposition are reported in Table 4.

While in 1991 total wealth concentration basically depended on both real assets (the relative contribution of which amounted to 43.6 percent) and social security wealth (37.6 percent), a very different picture emerged a decade later, when real assets maintained a primary role (43.2 percent) and the relative contribution of social security wealth had grown smaller (30.1 percent).[16] Another component of total wealth, financial assets, acquired considerable weight (26.9

[16]The smaller role played by social security wealth crucially depends on the fact that, despite the Gini index of such component of total wealth increased over time, its share on total wealth declined from 47 percent to 35 percent.

percent) in explaining total variability. Financial liabilities are the most concentrated component of total wealth both at the beginning and at the end of the period, although their relative contribution to overall inequality is negligible since they account for a very small (negative) part of total wealth.

4. Pension Reforms and Social Security Wealth Distribution by Age Class

As mentioned in Section 1, after the 1995 pension reform all individuals with at least 18 years of contributions in 1995 remained under the old earnings related scheme, while workers with less than 18 years of contributions will retire with a weighted mixture of pre- and post-reform benefits. In fact, taking also into account current retirees, the 1995 reform divided living population into three age groups who have been differently touched by the perspective cut in social security wealth. The aim of this section is to focus on the distributive implications by age class of such a reform.

Apparently, the 1995 reform had a stronger negative impact on younger workers than on the remaining population. Table 5 shows that households with a head that is younger than 46 represented 21.5 percent of the bottom 20 percent of total wealth distribution in 1991. The same group reached a peak of 32.6 percent in 2000. Within this age group, the proportion of households with negative social security wealth climbed from 22.6 percent in 1991 to a peak of nearly 48.7 percent in 1998, whereas the proportion of households definable as "young" according to the above criterion, remained fairly stable at around 33 percent.

Even if the dataset does not enable us to follow the same individuals over the course of time, as in a panel, we can nevertheless follow the average lifetime path of each cohort during the time period of the estimation. We divided our sample into four groups, according to the year of birth of the head of the household: the first group comprises individuals born before 1936; the second, those individuals born between 1936 and 1945; the third, those individuals born between 1946 and

TABLE 5
Young Households* and Total Wealth, 1991–2002

Year	Share of the Population (%)	Share in the First Quintile of Total Wealth (%)	Share in the First Quintile of Total Wealth with Negative Social Security Wealth (%)
1991	33.0	21.5	22.6
1993	35.2	26.3	29.1
1995	32.8	28.6	48.0
1998	32.4	32.4	48.7
2000	33.4	32.6	42.6
2002	32.9	30.3	42.9

Note: *Young households are defined as those households where the head is younger than 46.

TABLE 6

AVERAGE VALUE OF SOCIAL SECURITY WEALTH BY HOUSEHOLD HEAD AGE, AS A PROPORTION OF THE OVERALL AVERAGE VALUE OF THE SAME VARIABLE, 1991–2002

	Year of Birth			
Year	Before 1936	From 1936 to 1945	From 1946 to 1959	After 1959
1991	70.2%	87.4%	128.0%	98.9%
1993	49.5%	81.9%	137.9%	104.8%
1995	43.3%	88.0%	154.1%	103.8%
1998	41.1%	104.1%	160.3%	96.1%
2000	27.8%	118.2%	164.5%	79.7%
2002	25.5%	129.2%	157.2%	75.3%

1959; and the fourth, those individuals born in 1960 or later.[17] We computed the average value of social security wealth for each group, and for each year from 1991 to 2002, and then compared our results with the overall average value of the same variable. The results are shown in Table 6.

Calculations confirm that pension reforms reduced social security wealth to different degrees depending on the year of birth of those concerned. Let us consider, for example, individuals born after 1959, whose median age was 29 years in 1991. Without pension reforms, their social security wealth would have increased over the course of time, given that individuals within the group are accumulating their pension wealth. However in 2002, when the median age of the group is 38 years, their relative position with respect to the overall population is even worse than it was in 1991. On the contrary, the group of individuals born from 1936 to 1945 was relatively better off at the end of the period, at a time when the median age of this group was 62 years, and a substantial share of those concerned were already retired, and therefore gradually consuming their social security wealth.

Finally, we compute the Gini index for total wealth and its two components (net worth and social security wealth), after having sorted out individuals according to the household head age. During the period in question, total wealth inequality increased among middle-aged households, and even more among elderly households, with their respective Gini indices increasing by 8 and 20 percentage points, from 42.9 percent to 51.4 percent in the first case, and from 39.2 percent to 59.5 percent in the second case (see Table 7a). The exception is represented by young households, whose Gini coefficient initially increased, from 46.1 percent in 1991 to 56.0 percent in 1998, before falling back to 43.6 percent at the end of the period in question. The trend of inequality for net worth by age class (Table 7b) seems to mirror rather closely the equivalent trend in total wealth, whereas a different picture emerges in the case of social security wealth (Table 7c). If we examine the Gini index for social security wealth, we find that among young heads of households (age class below 46) the index climbed from 44.0 percent to 76.3 percent, with a peak of 85.8 percent in 1998.[18] The dynamics of the Ginis for the

[17]The median age for these groups is equal to 66, 51, 39, and 29 years in 1991, and 74, 62, 50, and 38 in 2002.

[18]Within this subgroup of the total population, the share of households with negative social security wealth increased dramatically from 4 percent in 1991 to 13 percent in 1993. Thereafter, the said percentage remained fairly constant at around the 1993 level.

TABLE 7a

THE GINI INDEX FOR TOTAL WEALTH BY HOUSEHOLD HEAD AGE

Year	Below 46	From 46 to 60	Above 60
1991	46.1	42.9	39.2
	(0.011)	(0.011)	(0.010)
1993	46.3	49.6	50.7
	(0.010)	(0.011)	(0.011)
1995	50.9	50.3	51.0
	(0.010)	(0.010)	(0.011)
1998	56.0	54.7	52.1
	(0.015)	(0.023)	(0.015)
2000	52.8	55.2	57.1
	(0.011)	(0.013)	(0.021)
2002	43.6	51.4	59.5
	(0.014)	(0.011)	(0.013)

Source: Authors' calculations from SHIW-HA figures. Asymptotic standard errors in parentheses.

TABLE 7b

THE GINI INDEX FOR NET WORTH BY HOUSEHOLD HEAD AGE

Year	Below 46	From 46 to 60	Above 60
1991	60.2	55.2	50.5
	(0.015)	(0.011)	(0.011)
1993	55.1	58.5	60.6
	(0.011)	(0.012)	(0.013)
1995	55.6	59.3	60.6
	(0.012)	(0.011)	(0.011)
1998	61.0	65.5	62.6
	(0.015)	(0.027)	(0.016)
2000	57.3	65.2	67.2
	(0.013)	(0.015)	(0.023)
2002	48.5	61.1	67.6
	(0.014)	(0.014)	(0.014)

Source: Authors' calculations from SHIW-HA figures. Asymptotic standard errors in parentheses.

TABLE 7c

THE GINI INDEX FOR SOCIAL SECURITY WEALTH BY HOUSEHOLD HEAD AGE

Year	Below 46	From 46 to 60	Above 60
1991	44.0	45.3	42.5
	(0.008)	(0.008)	(0.008)
1993	55.9	53.9	51.5
	(0.008)	(0.009)	(0.007)
1995	81.7	56.4	51.5
	(0.009)	(0.010)	(0.007)
1998	85.8	54.6	49.3
	(0.009)	(0.009)	(0.014)
2000	80.2	54.3	53.2
	(0.017)	(0.009)	(0.007)
2002	76.3	52.4	57.8
	(0.011)	(0.008)	(0.007)

Source: Authors' calculations from SHIW-HA figures. Asymptotic standard errors in parentheses.

remaining households (age class from 46 to 60, and above 60) showed a less marked increase, which was mainly concentrated after the first pension reform in 1992: the index rose by 7 percentage points for middle-aged households, and 15 percentage points for elderly households.

5. Conclusions

This paper estimates for the first time, an "augmented" measure of wealth inclusive of social security wealth, and it examines the composition and distribution of this augmented wealth among Italian households during the period 1991–2002. The main results of our study are as follows:

- Augmented wealth was found to have remained roughly constant over the last decade, as the combined result of two opposing factors, namely, an increase in net worth (i.e. real and financial assets net of debts), and a stronger, parallel decline in social security wealth due to the pension reforms of 1992 and 1995.
- The key factors in the reduction in social security wealth were the abolition of indexation of pensions to real wage growth from 1993 onwards, which affected all existing and future pensioners, together with the changes made to the computation of pension benefits, which mainly affected young workers and the self-employed. As a result of these trends, the respective weights of the two components of total wealth (net worth and social security wealth) changed dramatically: while in 1991 social security wealth accounted for about one half of total wealth, at the end of the period in question it amounted to less than one third of total wealth. This reduction affected all households, regardless of their position in the distribution of total wealth, albeit to a different degree.
- After rising steeply at the beginning of the 1990s, augmented wealth inequality leveled off during the second part of the period in question. Social security wealth contributed most to this initial rise; the distribution of social security wealth, although less unequal than the distribution of real and financial wealth, widened at a much faster pace than did the latter during the first half of the decade. In fact, the pension reforms implemented over the last decade seem to have reduced the equalizing effect of social security wealth on augmented wealth.
- The Gini decomposition by wealth factor shows that, while in 1991 total wealth inequality basically depended on both real assets and social security wealth, a different picture emerged a decade later, when real assets maintained their primary role whereas social security wealth played an increasingly smaller role. Another component of total wealth, financial wealth, acquired considerable importance in explaining overall variability.
- Wealth inequality by age class displays different time patterns. While the variability of net worth among young households tends to decrease, the opposite is true of middle-aged and elderly households, probably due to the increasing propensity of these subgroups to invest in risk-bearing financial assets. As far as social security wealth inequality is concerned, it increased for all age classes, and was particularly marked among younger households.

APPENDIX 1: DATA ADJUSTMENT WITH REGARD TO FINANCIAL AND REAL WEALTH

In order to account for the phenomenon of non-response, the weights adjusted for differential response rates across households with different characteristics (including diverse levels of income and wealth) have been recalculated (see D'Alessio and Faiella, 2002). The Bank of Italy does not address the non-response issue by over-sampling of high-income households, since a reliable list of such households from which additional units may be obtained is not currently available. The adjustment for the non-reporting and under-reporting of financial assets is based on the outcome of the statistical matching of the 1987 SHIW with the micro-data survey carried out in the same year by the Banca Nazionale del Lavoro on a sample of its own customers (see Cannari and D'Alessio, 1993). The method used to account for the non-reporting of dwellings not occupied by their owners, is based on the assumption that the probability of owning a dwelling other than one's own place of residence follows a Poisson distribution. The estimates of this distribution have been used to impute ownership (Cannari and D'Alessio, 1990). The correction procedures had a substantial impact on the surveys carried out in the 1990s. On average, the adjustments made increased the mean values of real estate and of financial assets by 31 percent and 148 percent, respectively. Overall, the shortfall compared with macro sources was reduced from 75 to 39 percent for total financial assets, from 26 to 8 percent for real assets, and from 41 to 17 percent for net worth (Brandolini *et al.*, 2006). Furthermore, the adjustments bring the composition of household wealth closer to aggregate evidence. However, the corrections vary considerably from one year to the next, and consequently so do the remaining discrepancies regarding aggregate figures.

Table A1 reports, for the period 1991–2002, unadjusted and adjusted data for mean household net worth and the corresponding Gini indices. As we can see, when the data are not adjusted, the mean net worth would be at least 30 percent

TABLE A1

UNADJUSTED AND ADJUSTED DATA FOR MEAN HOUSEHOLD NET WORTH AND THE GINI INDICES, 1991–2002 (AT 2002 PRICES IN THOUSANDS OF EURO)

Year	Mean Net Worth (Unadjusted)	Mean Net Worth (Adjusted)	Gini Net Worth (Unadjusted)	Gini Net Worth (Adjusted)
1991	140.3 (−36.9%)	222.3	59.1% (4.5%)	56.6%
1993	162.3 (−33.0%)	242.2	62.9% (6.3%)	59.2%
1995	161.1 (−32.7%)	239.4	61.4% (3.0%)	59.7%
1998	171.4 (−36.6%)	270.4	63.3% (−3.1%)	65.4%
2000	180.9 (−36.5%)	284.8	63.0% (−3.8%)	65.5%
2002	189.4 (−33.4%)	284.5	62.1% (−1.5%)	63.0%

Source: Authors' calculations from SHIW-HA figures. Mean values are expressed at 2002 prices calculated using the consumer price index. Percentage change with respect to the adjusted figure in parentheses.

lower than the corresponding adjusted value. Unadjusted data also convey the impression of a more stable distribution, even though, regardless of whether data are adjusted or not, the Gini index in 1991 is much lower than in 2002.

APPENDIX 2: THE ESTIMATION OF SOCIAL SECURITY WEALTH

The estimation of social security wealth involves numerous approximations together with a series of hypotheses, all of which are reported below:

(1) We express all social security wealth values in 2002 constant Euros, and we assume perfect foresight regarding future inflation and a complete price-indexation mechanism.

(2) We assume that workers have full knowledge of the pension rules.

(3) There are two possible reasons why individuals retire: either they have a sufficient number of years of pension contributions to claim a seniority pension, and thus they leave the job immediately; or they exit the labor market when they reach the legal retirement age.[19]

(4) Life expectancies used for the computation of SSW are taken from fore-casted survival estimations provided by the Italian National Statistical Office (Istat).

(5) Lifetime earnings used to compute future pension benefits and future contributions are estimated for men and women separately, and they distinguish between payroll employees and the self-employed. We control for age, education and cohort.

(6) A constant rate of growth of gross wages and the discount rate, equal to 1.5 and 2.0 percent respectively, are assumed.

(7) Indexation of pensions only corresponded to earnings growth in 1991. Thereafter, individual pensions have been kept constant in real terms.

Lifetime earnings profiles used in empirical studies to estimate SSW in Italy are derived from two datasets: the SHIW and the administrative records of Italy's National Social Security Institute (INPS). We have used SHIW data here to model the complete age-earnings profile. SHIW data, unlike the INPS records, do not allow a panel analysis to be carried out, but they do have the advantage of covering the entire range of public pension schemes.

The income figures from the surveys are net of personal income tax, and so we grossed up net incomes using the following procedure: by letting YN_i and W_i be the net income and the gross income of individual i, respectively, his/her gross income is then calculated by solving the following equation:

$$(A1) \qquad W_i = \frac{YN_i - (t_{j+1} - t_j)Y_{j+1} - \ldots - (t_{j+n} - t_{j+n-1})Y_{j+n} - D_i}{(1 - t_{j+n-1})}$$

[19]The legal retirement age is 65 for men and 60 for women. From 2008 onwards, male workers may retire at the age of 60 if they have paid contributions for at least 40 years; early retirement requirements are less restrictive prior to that date.

TABLE A2

DETERMINANTS OF THE LOG OF INCOME

	Male Employees		Female Employees		Male Self-Employed		Female Self-Employed	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age	0.065	21.45	0.037	7.44	0.060	5.41	0.065	3.42
Age-squared	−0.0006	−17.61	−0.0003	−5.21	−0.0005	−4.19	−0.0006	−2.94
Educational level								
Secondary	0.252	41.28	0.300	32.35	0.225	10.72	0.122	3.07
Higher	0.508	51.15	0.497	38.98	0.521	17.93	0.264	5.33
Year of birth								
1946–55	−0.027	−2.34	0.013	0.66	0.075	2.05	0.122	1.73
1956–65	−0.043	−2.78	−0.031	−1.25	0.067	1.33	0.252	2.67
After 1965	−0.096	−5.02	−0.067	−2.35	0.091	1.44	0.284	2.57
Constant	8.232	132.67	8.451	90.65	8.156	35.65	7.705	19.93
R-squared	0.251	—	0.181	—	0.137	—	0.123	—
Obs.	20,841	—	12,614	—	5,099	—	1,801	—

Notes: Calculations are based on the SHIW for the period 1991–2002. We have excluded observations with extreme, implausible values for incomes and ages. The omitted dummy is "primary level" for education and "before 1946" for the cohort.

where: W_i = gross income of individual i; YN_i = net income of individual i; Y_j = the upper limit of personal income tax bracket j; $j = 1, \ldots, n$ where n is the number of income brackets; t_j = the marginal tax rate of income bracket j; and D_i = tax credit of individual i.

Earnings profiles by gender and occupational status (employee or self-employed) are obtained as a result of regressing the logarithm of gross earnings on a second degree polynomial on age and a series of dummies which take into account three different levels of education and the date of birth. Table A2 shows the results of this estimation.

Gross wages for each worker are then calculated per year on the basis of the appropriate regression coefficients and of the real growth rate, which is equal to the average registered growth rate for past years, and to 1.5 percent for future years. Gross wage profiles are then used to estimate the lifetime development of contributions, and to compute the first year pension benefits for each active worker. We assume that workers' careers are continuous, as a result of which, social security wealth is probably overestimated. An individual's age when first coming on to the labor market is exogenously established according to that person's educational level: 20, 25, and 30 years of age, respectively, for those with a primary, secondary, or higher education.

The reforms introduced during the 1990s modified several aspects of the system, such as retirement age, eligibility criteria, benefits computation, the level of contributions, and indexation rules. In order to take account of the said path to transition, we subdivided our sample data into different groups, according to the occupational status and seniority of individuals during the year in which the sample was taken. The resulting five groups are as follows:

(1) Retired people: pensions are not calculated for this group, since the SHIW surveys report the net value of pension benefits received.[20]
(2) All workers from the 1991 survey, as no reform had been enacted yet that particular year.
(3) All workers with at least 15 years' service in 1992 or 18 years service in 1995.
(4) All workers with fewer than 15 years' service in 1992.
(5) All workers who entered the labor market after 1995.

Within each of the above four groups of workers, employees and the self-employed were analyzed separately.

The first year pension benefit was then computed as a weighted average of various different components. A summary of the computation procedure is reported in Table A4.

Table A3 reports results of a sensitivity analysis carried out on the mean value of social security wealth and on the Gini Indices for total wealth and social security wealth. Our figures show that, at least in qualitative terms, the distributive trends over time are substantially unaffected by the values chosen, while, as far as the mean values are concerned, the results appear relatively sensitive to the value of the discount rate.

TABLE A3

SENSITIVITY ANALYSIS FOR THE COMPUTATION OF THE SOCIAL SECURITY WEALTH AND THE ESTIMATION OF THE GINI INDEX, 1991–2002 (AT 2002 PRICES IN THOUSANDS OF EURO)

Year	Baseline	$m = 1\%$	$m = 2\%$	$r = 1.5\%$	$r = 2.5\%$	$r = 3.5\%$
Mean value of social security wealth						
1991	194.2	188.2	199.0	207.5	163.4	139.6
1993	138.2	138.0	139.3	162.9	118.6	100.2
1995	135.7	134.8	136.4	157.6	117.5	102.1
1998	143.7	142.7	144.4	166.1	125.0	109.2
2000	149.5	148.6	150.2	173.3	129.6	113.0
2002	156.2	155.2	156.8	180.6	135.7	118.4
The Gini Index for total wealth						
1991	43.3%	43.7%	43.0%	46.5%	44.7%	46.1%
1993	49.2%	49.2%	49.1%	47.9%	50.5%	52.0%
1995	51.2%	51.2%	51.0%	49.8%	52.4%	53.6%
1998	55.7%	55.7%	55.6%	54.2%	57.1%	58.4%
2000	56.0%	56.0%	56.0%	54.4%	57.5%	59.0%
2002	54.4%	54.4%	54.4%	52.9%	55.8%	57.2%
The Gini Index for social security wealth						
1991	44.9%	45.6%	44.7%	42.5%	46.7%	49.6%
1993	52.2%	52.4%	51.7%	49.8%	55.9%	61.7%
1995	57.6%	57.7%	57.3%	54.0%	62.1%	67.6%
1998	58.2%	58.3%	58.1%	54.7%	62.7%	68.0%
2000	57.6%	57.6%	57.5%	53.8%	62.3%	67.8%
2002	57.2%	57.0%	57.2%	53.5%	61.7%	67.1%

Notes: *m*, constant real wage growth; *r*, constant real discount rate.

[20]In order to maintain a degree of homogeneity with the estimated values of pension benefits for the active population, we grossed up net pension benefits by following the same procedure previously described.

TABLE A4

Computation of Pension Benefits

Workers in 1991 and Workers with At Least 15 Years' Service in 1992	Workers with Fewer Than 15 Years' Service in 1992	Workers Who Entered the Labour Market After 1995
The pension formula is: $B^A = 0.02*(N_1W_1 + N_2W_2)$ where W_1 and W_2 are pensionable earnings; N_1 and N_2 are the years of paid contributions. For contributions paid in before 1992, W_1 is the average of the last 5/10 years service for employees/the self-employed, respectively. For contributions paid in after 1992, W_2 is the average of the last 10/15 years for employees/the self-employed, respectively. The contribution rate is 27% of earnings for employees and 12% for the self-employed in 1991.	The pension formula is: $B^C = \beta B^A + (1-\beta)B^B$ with $B^A = 0.02*(N_1W_1 + N_2W_2)$ where: W_1 and W_2 are pensionable earnings; N_1 and N_2 are the years of paid contributions. For contributions paid in before 1992, W_1 is the average of the last 5/10 years for employees/the self-employed, respectively. For contributions paid in after 1992, W_2 is computed on a progressively increasing number of years of work (N_2). N_2 is equal to the entire life of work for an employee who started working in 1993. The contribution rate is 33% of earnings for employees and 20% for the self-employed.	The pension formula is: $B^B = k*MC$ where: k is an almost actuarially fair transformation coefficient, ranging from 0.472 at the age of 57 to 0.614 at the age of 65. Coefficients are adjusted every 10 years in order to take account of expected increased longevity. MC is the sum of contributions accrued during an entire working life, and capitalized at the rate of growth of nominal GDP, up to the maximum threshold of taxable income. The contribution rate is 33% of earnings for employees and 20% for the self-employed.

References

Atkinson, Anthony B., "On the Measurement of Inequality," *Journal of Economic Theory*, 2, 244–63, 1970.

Attanasio, Orazio and Agar Brugiavini, "Social Security and Household Saving," *The Quarterly Journal of Economics*, 118, 1075–119, 2003.

Banks, James, Carl Emmerson, Zoë Oldfield, and Gemma Tetlow, *Prepared for Retirement? The Adequacy and Distribution of Retirement Resources in England*, The Institute for Fiscal Studies, London, 2005.

Brandolini, Andrea, Luigi Cannari, Giovanni D'Alessio, and Ivan Faiella, "Household Wealth Distribution in Italy," in Edward N. Wolff (ed.), *International Perspectives on Household Wealth*, Edward Elgar, Cheltenham, 2006.

Brugiavini, Agar and Franco Peracchi, "Social Security Wealth and Retirement Decisions in Italy," *Labour*, 17, 79–114, 2003.

Burkhauser, Richard V. and Robert R. Weathers II, "Access to Wealth Among Older Workers in the 1990s and How It Is Distributed: Data from the Health and Retirement Study," in Thomas N. Shapiro and Edward N. Wolff (eds), *Assets for the Poor: The Benefits of Spreading Asset Ownership*, Russell Sage Foundation, New York, 74–131, 2001.

Cannari, Luigi and Giovanni D'Alessio, "Housing Assets in the Bank of Italy's Survey of Household Income and Wealth," in Camillo Dagum and Michele Zenga (eds), *Income and Wealth Distribution, Inequality and Poverty*, Springer-Verlag, Berlin, 326–34, 1990.

———, "Non-reporting and Under-reporting Behavior in the Bank of Italy's Survey of Household Income and Wealth," in *Proceedings of the ISI 49th Session*, ISI, Florence, 395–412, 1993.

———, "Composizione e distribuzione della ricchezza delle famiglie," in Nicola Rossi (ed.), *La transizione equa, 1992–1993. Secondo Rapporto CNEL sulla distribuzione e redistribuzione del reddito in Italia*, Il Mulino, Bologna, 245–77, 1994.

Castellino, Onorato and Elsa Fornero, *La riforma del sistema previdenziale italiano*, Il Mulino, Bologna, 2001.

D'Alessio, Giovanni and Ivan Faiella, "Non-response Behaviour in the Bank of Italy's Survey of Household Income and Wealth," Banca d'Italia, Temi di discussione, No. 462, December 2002.

Davies James B. and Anthony Shorrocks, "The Distribution of Wealth," in Anthony B. Atkinson and Francois Bourguignon (eds), *Handbook of Income Distribution*, Vol. 1, North-Holland, Amsterdam, 605–75, 2000.

European Commission, "Current and Prospective Theoretical Pension Replacement Rates," Report by the Indicators Sub-Group (ISG) of the Social Protection Committee (SPC), 2006 (available at: http://ec.europa.eu/employment_social/spsi/docs/social_protection/isg_repl_rates_en.pdf)

Feldstein, Martin, "Social Security and the Distribution of Wealth," *Journal of the American Statistical Association*, 71, 800–7, 1976.

Feldstein, Martin and Jeffrey Liebman, "Social Security," in Alan J. Auerbach and Martin Feldstein (eds), *Handbook of Public Economics*, Vol. 4, North-Holland, Amsterdam, 2245–324, 2002.

Foster, James E., "Inequality Measurement," in H. Peyton Young (ed.), *Fair Allocation*, Proceedings of Symposia in Applied Mathematics, Vol. 33, American Mathematical Society, Providence, RI, 31–68, 1985.

Franco Daniele, "Italy: A Never-Ending Pension Reform," in Martin Feldstein and Horst Siebert (eds), *Social Security Pension Reform in Europe*, The University of Chicago Press, Chicago, 2002.

Gustman, Alan, Olivia Mitchell, Andrew Amwick, and Thomas Steinmeier, "Pension and Social Security Wealth in the Health and Retirement study," NBER Working Paper, No. 5912, 1997.

Jappelli, Tullio and Franco Modigliani, "The Age-Saving Profile and Life-Cycle Hypothesis," CSEF Working Paper, No. 9, 1998.

Jappelli, Tullio and Luigi Pistaferri, "The Dynamics of Household Wealth Accumulation in Italy," *Fiscal Studies*, 21, 269–95, 2000.

Jenkins, Stephen P. and Markus Jäntti, "Methods for Summarizing and Comparing Wealth Distributions," ISER Working Paper No. 05, University of Essex, Institute for Social and Economic Research, 2005 (forthcoming in *Construction and Usage of Comparable Microdata on Household Wealth: The Luxembourg Wealth Study. Papers Presented at the Banca d'Italia Workshop Held in Perugia, 27–29 January 2005*, Banca d'Italia, Roma).

Kennickell, Arthur B. and Annika Sunden, "Pensions, Social Security, and the Distribution of Wealth," Mimeo, Federal Reserve Board of Washington, 1999.

Lindbeck, A. and M. Persson, "The Gains from Pension Reforms," *Journal of Economic Literature*, 41, 74–112, 2003.

McGarry, Kathleen M. and Andrew Davenport, "Pension and the Distribution of Wealth," NBER Working Paper No. 6171, 1997.

Pyatt, Graham, Chau-Nan Chen, and John Fei, "The Distribution of Income by Factor Components," *Quarterly Journal of Economics*, 95, 451–73, 1980.

Sartor Nicola, "Generational Accounting in Italy," in Auerbach Alan, Kotlikoff Laurence, and Willi Leibfritz (eds), *Generational Accounting Around the World*, NBER Press, Boston, 1999.

Shamsuddin, Abul F. M., "Public Pension and Wealth Inequality in Canada," *Applied Economic Letters*, 8, 315–20, 2001.

Sierminska, Eva and Timothy Smeeding "Measurement Issues: Equivalence Scales, Accounting Framework and Reference Unit," Paper presented at the LWS Workshop held in Perugia, Italy, January 27–29, 2005 (revised version: May 2005).

Wolff, Edward N., "The Effects of Pensions and Social Security on the Distribution of Wealth in the US," in E. N. Wolff (ed.), *International Comparisons of Households Wealth Distribution*, Oxford University Press, 1987.

———, "Is the Equalizing Effect of Retirement Wealth Wearing Off?" The Levy Economic Institute, Working Paper No. 420, 2005a (available at SSRN: http://ssrn.com/abstract=698203).

———, "Social Security, Pensions, and the Inequality of Household Wealth in the United States, 1983–2001," Paper presented at the first Meeting of the Society for the Study of Economic Inequality (ECINEQ) held in Palma de Mallorca, Spain, July 20–22, 2005b.