INTERGENERATIONAL EQUITY IMPLICATIONS OF PUBLIC FINANCE CONSOLIDATION IN ITALY

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Abstract

The paper investigates fairness between generations of consolidation policies undertaken in Italy between 1990 and 2008. The tools used are those of the generational accounting literature, but emphasis is shifted from comparison between current and future generations to differences among current generations. Large intergenerational differences exist in net tax rates calculated over the residual time horizon, which tend to be substantially higher for young generations. Those facing comparatively high tax rates tend to coincide with those subject to all of the effects of pension reforms introduced in the '90s. We conclude that the substantial contribution to sustainability of these reforms might come at the price of an unequal distribution of sacrifices across generations.

1 Introduction

Italy's approach to public finance management changed dramatically during the '90s, under the pressure of two major events: the financial crisis of 1992 and the decision to rapidly consolidate public finances in order to comply with the admission criteria to the first phase of the European Monetary Union. At the beginning of that decade the deficit was close to 12% of GDP, with public debt on an upward trend which would lead to a peak of 121.8% of GDP in 1994. After less than 10 years the debt-to-GDP ratio was reduced to 111.3%, whereas

*We are grateful to Nicola Sartor, for making the data used in the first application of generational accounting to Italy (Franco et al., 1993) and in subsequent works (Cardarelli and Sartor, 2000) available to us. The availability of those data was fundamental for the development of the present work. We also wish to thank him for his helpful comments. The usual disclaimer applies. The present work is a development of some ideas previously included in a contribution by the same authors to the forthcoming book: Schizzerotto A., Trivellato U., Sartor N. (eds.) "Generazioni Diseguali". Il Mulino, Bologna.

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deficit was 0.8% of GDP. The tension was somewhat released after the admission to EMU, as shown by the increase in the debt-to-GDP ratio in 2005, after more than 10 years on a downward path. Nevertheless, thanks to the binding constraints set by the "Stability and Growth Pact", Italy never went back to the pre-1992 regime. Although the contribution of policies undertaken since 1992 to consolidation was substantial, the current financial crisis is showing that much is still to be done. Since some similarities with the 1992 events are apparent, it is natural to wonder whether something can be learnt from that experience and the consolidation process that was carried out in subsequent years. While that process turned effective in achieving at least partial results in terms of improved sustainability, its allocative and redistributive implications are less clear and have received less attention in the literature (Balassone et al., 2003). Understanding which among living generations paid more for the past consolidation effort might prove useful to target future sacrifices in the perspective of intergenerational equity.

By means of the generational accounting (henceforth GA) methodology, a number of papers have investigated the impact of this process on both fiscal sustainability and intergenerational fairness (see for example Cardarelli and Sartor (2000) and Rizza and Tommasino (forthcoming); some contributions have also studied the implications of specific reforms, with mandatory pension reforms receiving by far the greatest attention (Sartor, 2001). In general, a GA approach allows an estimate of the additional burden (still to be legislated) that will have to be imposed on future generations to close the fiscal gap; i.e. the additional amount of net-taxes (compared to current policy scenario) which will be required if the Government is to repay (sooner or later) all its liabilities (both explicit and implicit). The additional burden represents the degree of intergenerational unfairness that current policies imply[1]. These studies have shown that the budgetary policies undertaken since the beginning of the '90s contributed to a substantial improvement in long term fiscal sustainability by reducing the present value of explicit and implicit liabilities.

However, the standard GA literature has only a forward-looking perspective on intergenerational equity. Far less attention has been paid to intergenerational differences among currently living generations. In order to contribute to the filling of this gap, the present paper uses the tools of GA, but departs from the prevailing emphasis on the comparison between current and future newborns, to assess to what extent different living generations (in a given base-year) paid for the reduction of the burden on future generations. Despite its well known limitations (Haveman, 1994; Diamond, 1996; Buiter, 1997), GA has a clear advantage in terms of comprehensiveness of the analysis with respect to alternative approaches. By apportioning all of tax and transfer programmes to currently living and future generations a clear picture of the role plaid by the public sector in terms intergenerational redistribution can be retrieved. Our analysis is based on the study of the differentials among the net payments (present value of the

[1]The implicit assumption made in the GA literature is that any additional fiscal burden will only be faced by future generations. This is a simplification to provide a measure of the degree of unfairness.

difference between taxes paid and transfers, both cash and in-kind, received) of current generations, over their residual lifetime horizon.

The study involves two steps. First, we compare the net lifetime tax rate over the residual lifetime horizon of three generations of the same age (in different base years). Comparing individuals of the same age ensures homogeneity, so that valuable information can be obtained even without imposing any structure in the model. The restriction on equality of age is relaxed in the second step, whose objective is to point out how fiscal policies undertaken since the '90s contributed to the differences arising from the previous analysis. This is done by comparing, for each cohort living in 1990, the net payment over the residual lifetime horizon consistent with actual data with a hypothetical scenario aimed at resembling the pre-1992 regime.

The main departure of our work from the traditional GA literature lies in its emphasis on actual policy reforms, as embedded in official budget data, rather than hypothetical ones. In conventional GA exercises, projections of each generation's average taxes and transfers (cash and in-kind) are obtained assuming stability of polices through individuals' life-cycles, so that the present value of net payments over the life-cycle only depends on current policies, productivity growth rates and discounting rates. For the present exercise we construct year specific age profiles for the main tax and transfer programmes, for each year from 1990 and 2008, whereas the conventional approach is applied to obtain projections for the subsequent years. A similar methodology was used in Auerbach et al. (1993) to calculate net lifetime tax rates for a large number of generations. In our case the calculation is restricted to the residual lifetime horizon. This is meant to reduce to a minimum the role of assumptions necessary to compensate for the lack of reliable data for past years. We believe that, at least in our case, the gain in reliability of results more than offsets the loss of information due to the need to drop a number of years (the first 19 or 37 years of life, depending on the case) from the analysis.

There are at least two advantages from replacing the conventional GA approach with this one. First, the impact of policies undertaken over a large number of years, rather than of specific reforms, can be assessed. Second, relying on actual data rather than on projections for a number of years allows to reduce the sensitivity of results to changes in parameter values, which is often pointed out as a limitation of GA.

The paper is organized as follows. Section 2 presents the methods employed in the paper in the context of the existing GA literature. Section 3 compares net tax rates over the residual lifetime horizon for different generations. Section 4 aims to highlight the role of fiscal polices undertaken since the '90s in determining intergenerational differences arising from the previous analysis. Section 5 concludes.

2 Background and methods

In the GA literature the concepts of sustainability and intergenerational equity are narrowly related. In the steady state only one level of a generation's net lifetime payment exists such that larger or smaller net payments need not be imposed to future generations to satisfy the intertemporal budget constraint (Kotlikoff, 1999). This justifies use of the difference between the net lifetime payment of the newborn and future generations as a measure of sustainability of public finances in practical GA exercises.

Generational accounts, i.e. the present value of net payments to the public sector over the lifecycle, are essentially obtained as the result of a two step procedure. First, the present value of the net payment is calculated for cohorts born before the base year according to current fiscal rules, under the assumption that the growth rate of the age-adjusted per-capita value of taxes/transfers is consistent with total productivity growth[2]. This generates future deficits or surpluses that in the second step are included in the intertemporal budget constraint to determine the fiscal burden on future generations (those not yet born in the base year) as a residual. The difference between the tax burden of representative individuals belonging to the generation of newborns and future generations is one of the indicators that GA provides for the assessment of either sustainability of the present fiscal stance, or the long-run impact of policy changes. Hence, the information provided in standard GA exercises is: *i)* relevant for the comparison between current and future generations, *ii)* essentially based on projections. However, the present value of net payments for current generations is also part of the results. This is of little interest as long as the objective is assessing sustainability of current fiscal policies. The reason is that differences in the generational accounts of individuals of different ages, calculated for a given budget policy, can hardly be used to draw conclusions on intergenerational (un)fairness of such policy. Even within a system ensuring perfect intergenerational equity, the net lifetime payment to the public sector would be largely affected by age in the base year. This is a natural consequence of the fact that the need for publicly provided services and transfers or the possibility to pay taxes may prevail at different ages. For example, the present value of the net tax over the residual lifetime horizon is typically positive for an individual who, having just started to work, will earn labour income and pay taxes on it for a large number of years before retiring, while it tends to become negative as retirement age is approached.

The problem of homogeneity in the intergenerational comparison can be addressed mainly in two ways:

A. Calculating the lifetime net payment for current generations by reconstructing data for a number of years preceding the base year[3].

B. Investigating policy changes rather than current fiscal policies to compare

[2] Alternatively, age-adjusted per-capita amounts may be made to grow at a pace consistent with forecasts on the budgetary value, apportioned according to the age-profile.

[3] See Auerbach et al. (1993) for an analysis based on the whole lifetime horizon.

impacts across generations living in the base year[4].

Both approaches can yield potentially useful insights but have also limitations. Generational accounting is data demanding even in its standard application, and this characteristic is exacerbated if data must be also collected for a number of past years. Moreover, the further one goes back in time the more likely that heroic assumptions must be introduced to compensate for the lack of data. For A, this implies a trade-off between the number of generations that can be compared, which is larger the larger the number of past years for which data are recovered, and reliability of results. B has obvious advantages in terms data requirements because it can be used to estimate the burden (reward) for living generations of a reform requiring nothing more the data needed for a standard GA exercise. However, it is questionable whether changes in the net payment for generations with different residual time horizons are immediately comparable or not. For example, it could be claimed that young generations are better equipped to face a large increase in the net tax, thanks to the opportunity to smooth effects over a longer residual lifetime horizon by adjusting consumption-saving profiles.

Sections 3 and 4 use the concepts underlying respectively A and B to evaluate the intergenerational distribution implications of budget policies undertaken in Italy from 1990 to 2008. We do so adjusting methods adopted in the previous literature with the objective of enhancing as far as possible the robustness of estimates and reducing the dependency on assumptions to a minimum. We exploit the fact that the history of GA is now about 20 years long and past data can be used to obtain precise estimates of year-specific age profiles for a number of years (19 in our case, from 1990 to 2008). In other words, we replicate the derivation of age-profiles which is made for the base year in conventional GA exercises, for each year between 1990 and 2008. In Section 2, this information is used to estimate a residual lifetime net tax rate for 3 generations living in 1990 (born in 1952, 1970, 1988). By combining different ages with different base years for the computation of GA we ensure homogeneity with respect to the residual lifetime horizon, whilst maintaining robustness thanks to an accurate definition of the age profiles between 1990 and 2008. As usual, this comes at a price. In this case this is related to the fact that the most insightful comparisons are not made over the entire life-cycle, but the residual.

The above analysis is then complimented with an exercise based on B, aimed at highlighting the role of the consolidation process undertaken mainly in the '90s in determining the differences in the net fiscal position of current generations. This requires the definition of a hypothetical scenario aimed at describing the most likely evolution consistent with the pre-1992 fiscal regime. The analysis of the differences for the different generations between the two scenarios provides insights into the intergenerational redistribution impact of the consolidation process.

[4]By replacing the comparison among levels with one among differentials the role of the age effect is clearly less important. Auerbach and Kotlikoff (1999) simulate the impact of hypothetical policy reforms on living generations aged between 21 and 75 in the base year.

3 Intergenerational differences in the lifetime net tax rate

The analysis carried out in this section uses official budget data for the years 1990-2008 as input, apportioned to representative individuals by age according to age profiles .Homogeneity in the comparison is ensured by comparing pairs of generations with the same position in the life-cycle, i.e. of the same age. This is possible in our framework because, having estimated year-specific age profiles for all years between 1990 and 2008, any year in this range can be used as base year for GA computation. Since different generations have the same age in different years, this can be exploited to make age homogeneous intergenerational comparisons. In principle, we could compare any pair of cohorts whose difference in age is less, or equal, to 18 years. To ensure that cohorts subject to comparison are sufficiently different, so that they can actually be seen as different generations, we make comparisons between cohorts whose difference in age is maximum in this range. A further desirable characteristic of the comparison is that the number of years in the residual lifetime horizon is sufficiently large. Individuals belonging to the cohort born in 1952 (hereinafter G1) are 38 in 1990, so that their lifetime net tax rate can be compared with that of the cohort born in 1970 (G2) on a age homogeneous basis using 2008 as base year for the latter. The fact that this comparison ignores exchanges with the public sector which take place in the first 37 years of life shall be born in mind in interpreting the results of the comparison. Nonetheless, this comparison will turn out to be particularly instructive. In 1990 G2 was 20, the age of the cohort born in 1988 (G3) in 2008, thus allowing for a further age homogeneous comparison. The results presented in the remaining part of this section are obtained computing generational accounts twice, using first 1990 and then 2008 as base years. The latter is a standard forward looking GA computation, which uses 2008 data for the projection of future taxes and transfers for each cohort. The former uses the same approach for years after 2008, whereas in the period 1990-2008 age specific average taxes and transfers are obtained from official budget data and year specific[5] age profiles based on either administrative or survey data.

A crucial assumption for obtaining estimates of future taxes and transfers concerns the productivity growth rate. In our baseline scenario a 0.5% growth rate is assumed, reflecting the average real growth rate of per-capita income over the period 1990-2008. The same criterion cannot be extended to pensions for two reasons. First, the complexity of the rules of calculation of the individual benefit is such that the link between the dynamics of these transfers and the dynamics of labour income over the same period might be very weak. Moreover, pension reforms implemented in the '90s have substantially changed these rules, explicitly introducing differences based on the number of years the individual had already been paying social contributions at the time when the reforms were

[5] In some cases, especially for earlier years, data did not allow to calculate year specific profiles, so that constancy of the profile has been assumed for some years.

approved[6]. In order to take all this complexity into account, prospective average pensions are estimated using the dynamic micro-simulation model Mind[7] and assuming a 0.5% real growth rate for labour income.

3.1 Results

Our analysis focuses on intergenerational differences in the ratio between generational accounts over the residual lifetime horizon and the present value of incomes over the same period, which yields a measure of lifetime net tax rates[8] (Auerbach et al., 1991). This measure shows a striking difference between G1 and G2, rising from 18% to 26%. On the other hand, the results show substantial equality between G2 and G3, whose lifetime net tax rate is approximately 20% in both cases[9]. In the remaining part of this section we investigate the determinants of this seemingly substantial intergenerational discrimination, by disentangling differences in all the main tax and transfer programmes. For the main aggregations of tax and transfer programmes[10] Figure 1 compares the net present value of the debt/transfer for both pairs of generations under examination. In general, the present value of the tax debt tends to be larger for the younger generation (G2 and G3 respectively in the upper and lower panel) for all the aggregations of taxes considered (personal income tax, indirect taxes, social contributions, other indirect taxes). The size of the increase in the tax burden faced by young generations ranges from a minimum of 1.8% for "other direct taxes" at age 38, to 21.4% of "personal income tax" at 20. A larger present value of taxes for younger generations does not necessarily imply that any additional burden is imposed on those generations. Part of this increase is explained by productivity growth which implies a larger tax base for the young generations, who experience 18 more years of potential growth before they reach the same age as the generation with whom they are compared.

As far as "in-kind" benefits are concerned, the figure shows that the present value of the monetary value of "health care services" and "education" is larger for younger generations. In the case of health care, this is a result of the increase in the per-capita value of health expenditure in real terms between 1990 and 2008. The average per capita increase in real terms was 1%, very close to the average per-capita GDP real growth (0.9%). This is somehow in contrast with the general tendency in industrialized countries, where age-adjusted health care expenditure grows more rapidly than GDP[11]. This was the result

[6] More details of the reforms are discussed in the following sections.

[7] The model is described in Vagliasindi et al. (2004)

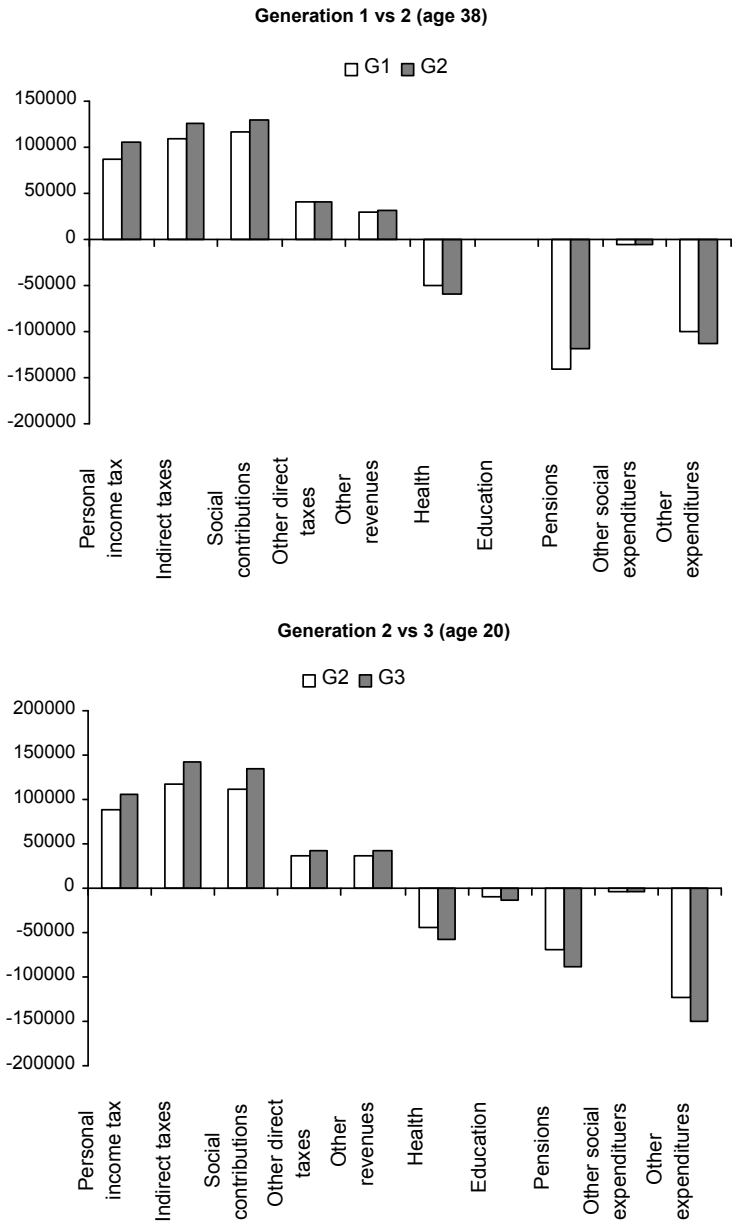
[8] The generational account of all of the cohorts that we consider is positive, both in 1990 and 2008.

[9] The difference in the lifetime net tax rate of G2 in the two comparisons is due to the fact that the base year and hence the age is different.

[10] In the GA estimate procedure, the entries presented in Figure 1 were further disaggregated.

[11] Several mechanisms have been discussed in the literature that could lead to this result (for an overview, see Gerdtham and Jonsson (2000). The best known among these is probably the "Baumol effect".

Figure 1: Present value of taxes and transfers over residual lifetime horizons (euro 2008)



of a number of policies, including expenditure cuts and the National Health Service re-organization, which made Italy one of the very few OECD countries to reduce health care expenditure over GDP during the '90s.
As to education, since the age of the cohorts that we compare is at least 20, our results loosely reflect changes, if any, concerning university education. Figure 1 shows an increase in the present value of education when cohorts under comparison are 20. Data show that this reflects an increase in participation to university education, rather than larger average per-student expenditure.
There is consensus on the fact that pension reforms[12] were the main structural reforms implemented. Whether this was sufficient to restore an equilibrium in the pension system or not is still debated, but the relevance of the reform is out of question (Sartor, 2001; Balassone et al., 2003). A first result that Figure 1 shows is that while the quality of differences between G1 and G2 is similar to those of the other public programmes, with younger generations of both comparisons paying more taxes and receiving more benefits as a result of growth differentials between the two base years, that results is reversed for pension benefits in the comparison between G1 and G2, where the effect of productivity growth is more than offset. The size of the advantage enjoyed by the older generation is large, with G2 receiving only 81% of G1 pension benefits over the same time-horizon. A better understanding of the magnitude of the effect of the reform requires to consider this cut in pension benefits, together with the larger amount of social contributions, through which pensions are funded, that the young pay.
The origin of this apparent intergenerational discrimination lies in the pension reforms' design. The main implications of those reforms were an increase in the minimum retirement age, a change in the rules for the computation of pension benefits, and a switch from wage to price indexation (Franco, 2002). The second point is the most relevant, especially in terms of intergenerational equity, because different rules between senior and junior workers and newcomers were introduced. The implications for the former were comparatively limited, the main change lying in an increase in the number of years whose salaries matter for the computation of the pension benefit. Under the pre-reform regime, pension benefits were computed applying a replacement rate to past salaries. With the 1995 reform a new regime was introduced, with benefits computed by applying a replacement rate to contributions paid, negatively related to life expectancy, compounded at the nominal GDP growth rate. Pension benefits are computed according to the new rules for those who entered the labour market starting from 1996, whereas past salaries are still the basis for computation for workers who had been paying social contribution for at least 18 years in 1995. For the remaining workers pension benefits are computed as weighted average of the application of the two rules, with weights proportional to the length of the periods of work before and after the reform. Overall, the new regime turns out to be far less generous than the old one.

[12]The current rules are mainly the result of two main reforms carried out in 1992 ("Amato reform") and 1995 ("Dini reform"). Less substantial changes were also introduced in subsequent years.

Given this set of rules, G1 are very likely to escape, at least to a large extent, the shift from salary based to contribution based pension benefits. The young generation that we compare to them is 18 years younger. Let's consider two individuals belonging one to G1 and one to G2 who start to work at the same age, such that the older falls into the old regime having worked 18 years in 1995. Pension benefits of the individual belonging to G1 are salary based, whereas those of the representative individual for G2 are contribution based. This is the reason why the system is far less generous towards the latter. By jointly observing that according to the rules G2 and G3 are treated in a similar way, and that the larger pension benefit G3 enjoys basically parallels the larger amount of contributions paid, we can conclude that the pension reform was the main driver of intergenerational inequity introduced by budgetary policies carried out in Italy since the '90s. This discrimination was not a side effect of the consolidation process carried out through a number of tools, but it was explicitly written in the rules defined by the pension reforms.

An obvious caveat of the above analyses is that they ignore exchanges with the public sector occurring respectively up to the age of 37 and 19. Although it is comparatively easy to defend 20 as a starting point[13], given that taxes and benefits paid and received up to that age are a small proportion of the whole generational account, the adoption of 38 as a starting point in the comparison between G1 and G2 requires some more explanation. It could be argued that if for some reasons G1 had received less that G2 during the first 37 years of life, the discrimination against G2 could just compensate for that. Although this is possible in theory, it is very unlikely to be true in practice given that the first 37 years of life of G1 coincide with a rapid expansion of both private economy and the role of the public sector.

A further objection could be that the impact of non-structural changes that might have occurred in the time lag between the two base years is only captured for the old generation in our estimates even though both generations experienced it in practice. In fact, some non-structural interventions aimed at fiscal consolidation were introduced in the period, and took the form of additional one-shot taxation[14]. Given that the base year for the younger generation in both comparison is 2008, these affect only the determination of the generational account of the older generations. When the young generation is 20, the impact of this omission is very likely to be minor, because the amount of taxes paid up to that age is negligible. This might no longer be true for the comparison between generations whose age is 38. However, given that non-structural taxation seems much more likely than non-structural spending to have taken place over the relevant period, a correction for the fact that also G2 paid something for these non-structural interventions would go in the direction of strengthening the main result of the present analysis, that is the higher lifetime net tax rate faced by G2 in comparison with G1.

The full comparison discussed in this section is restricted to only three cohorts

[13] Auerbach and Kotlikoff (1999) consider generations aged at least 21 in their analysis.

[14] Such taxes were levied both to contrast the effects of the financial crisis and to meet the criteria to join the Monetary Union.

among those living in 1990. However, the results of the analysis on these cohorts can be used to infer something on the position of other cohorts. It was shown above that most of the increase in the residual lifetime net tax rate experienced by the generation born in 1970 with respect to the one born in 1952 can be explained with the effects of the pension reforms. The comparison of these two generations is particularly instructive because, with some approximation, the older one can be considered subject to the pre-reform rules of pension benefits determination, whereas the younger one is subject to the new rules. This can also explain why differences tend to disappear when the 1970 generation is compared with the one born in 1988. The design of the pension reforms suggests some form of monotonicity in the effect for cohorts born between 1952 and 1970, given that for most of them pension benefits are likely to be calculated according to both the old and the new rules, with the weight of the former increasing with the number of years of work before 1995.

We conclude this section with a check of robustness of our results to alternative assumptions concerning productivity growth, which has often a relevant impact on GA results. In the baseline scenario commented above the growth rate used for the projections after 2008 equals the average growth rate over the period 1990-2008 (0.5%). We investigate the impact of making projections assuming a 1.5% growth rate[15]. Whereas in the baseline scenario the growth rate is constant over the whole life-cycle and equal across generations, the sensitivity scenario introduces a difference between the generations for which the present value of the net payment is computed using 1990 as base year, and those for which the base is 2008. The former experience a lower growth rate for the first 18 years of their life-cycle (0.5% vs. 1.5%). Given the conventional assumptions on which estimates of cohort specific individual taxes and transfers per year are based, this implies that the present value of both taxes and transfers tends to be larger for the young generations. Therefore, the gaps between the present value of each tax and transfer programme tend to be wider than those shown in Figure 1[16]. However, the quality of the results previously discussed, with a large loss moving from G1 to G2 and substantial stability between G2 and G3 is confirmed. Although this analysis is still partial, the results go in the direction of confirming a reduced sensitivity of our results to assumptions on productivity growth with respect to conventional GA studies.

4 The impact of consolidation

The analysis carried out in the previous section showed intergenerational discrimination against comparatively young generations. Although the correspondence between generations with a higher lifetime net tax rate and those subject to all of the effects of pension reforms suggest that these are likely to play a

[15] This rate is assumed in some official long-term projections of public expenditure. See, for example, dello Stato (2009).

[16] An exception to this is pension benefits for those aged 38, because in the baseline case the amount is smaller for the young generation.

major role in explaining those differences, properly disentangling the impact of fiscal policies undertaken since the '90s would require comparing the scenario based on actual data with some kind of counterfactual scenario. In this section we relax the homogeneity constraint on the length of residual lifetime horizon and compare the residual lifetime net payment for different living generations in 1990 under the "consolidation scenario" (hereinafter, C) with the corresponding amount under a "hypothetical scenario" (H) aimed at describing the consequences of not having initiated a consolidation process. While scenario C corresponds to the one based on actual data, which is also the one used in the exercises carried out in the previous section with 1990 as base year, the assumptions underlying the definition of scenario H are outlined in the following subsection.

4.1 Hypothetical scenario

Since in standard GA applications the aim is prospectively assessing the sustainability of current fiscal policies, base year policies are assumed to remain in place over the whole time horizon. The aim of the definition of scenario H in our exercise is consistent with that of standard GA applications, since we want to describe the situation that would have been observed if the consolidation process had not been undertaken, or, in other words, if the fiscal policy had been consistent with the pre-1992 regime over the whole time horizon . Needless to say that such an exercise involves substantial degrees of subjectivity, we aim to reduce this to a minimum and to obtain estimates as robust as possible to the introduction of alternative assumptions. In order to achieve this, scenario H is consistent with a hypothetical GA exercise undertaken in 1990 to assess sustainability. Average taxes and transfers for 1990 are calculated using the conventional approach, whereas for subsequent years they are assumed to grow at the same rate as productivity. The only difference with a standard application is that for the period 1991-2008 actual rather than hypothetical productivity growth rates are available. In facts, growth rates of public expenditure in the 70s and the 80s were often substantially above productivity growth rates. Replicating this tendency after 1990 would lead to virtual deficits larger than those that we obtain with our assumptions, implying that what we obtain is likely to be a lower bound for the size of the impact of the fiscal consolidation process.
There are only two exceptions to the previously discussed approach to the definition of scenario H: mandatory pensions and health care expenditure. The relationship with productivity growth is far less direct for pensions than for other tax and transfer programmes and it may be substantially affected by the characteristics of the pension scheme. Whatever the rules, however, transfers related to pensions in period t are related to productivity (especially labour productivity and hence wages) not in period t, but in earlier periods. Having once more in mind the objective of obtaining an estimate of the impact of reforms as robust as possible, we assume that the growth rate of average pension transfers over the period 1991-2008 is equal to the growth rate actually observed. In other words, we are assuming that pension reforms had no impact until 2008,

which is again leading to a lower bound for the estimated impact of the reform. After 2008, we link the growth of average pension benefits to the growth rate of average labour income over the period 1990-2008 to account for the fact that pension incomes are related to the past dynamics of labour income. In particular, we assume that the ratio between the growth rate of pension transfers after 2008 and the average growth rate of labour income over the period 1990-2008 equals the ratio between the average growth rate of pension transfers between 1990 and 2008 and the average growth rate of labour income between 1974 and 1991[17].
For health care expenditure, the exception to the base rule reflects its tendency, common to virtually all developed countries, to grow more rapidly than GDP. In order to account for this, it is assumed that the GDP adjusted growth rate of the average in kind transfer per capita reflects what was observed over the period 1981-1991[18].

4.2 Results

Since the existence of a consolidation process for public finances in Italy is the motivation for our work, we start by checking whether this assumption is confirmed by data. One measure of sustainability that GA provides is the difference between generational accounts of newborns and future generations. This difference was 219,698 euros[19] under scenario H while it is reduced to 27,133 euros under C, implying that although full sustainability is not achieved yet, policies undertaken between 1990 and 2008 provided valuable contribution in that direction. Our main objective is studying the implications of the actions undertaken to achieve this result, in terms of fairness among generations living in 1990.

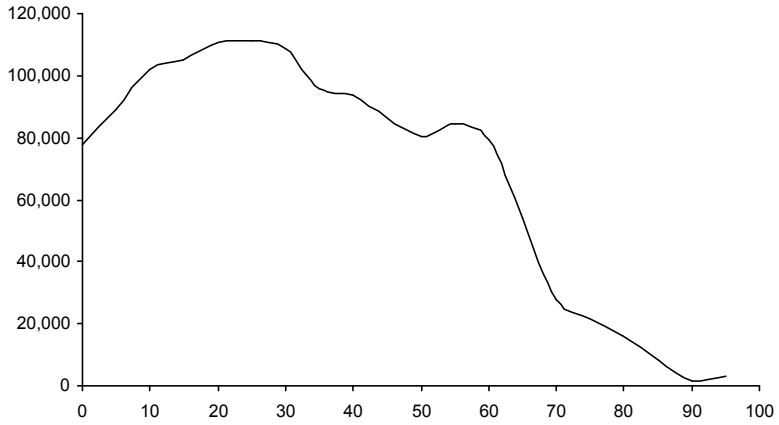
Figure 2 shows the impact on generational accounts for all cohorts living in 1990. All of them paid a price, but there are big differences among cohorts. The largest increase in the net payment over the residual lifetime horizon was suffered by those who were 25 in the base year (111,176 euros), with a tendency of the net loss to decline for ages higher than that, and a particularly rapid decline for ages above 60. However, these data must be carefully interpreted given that they are computed over different time horizons for the different living generations (Auerbach et al., 1993). The determinants of differences in the impact on net taxes across generations may be explored by separating the results of different tax/transfer programmes. For a number of representative cohorts (ages 10, 30, 50, 70), Figure 3 illustrates the net present values of the main aggregations of tax/transfer programmes. The two bars, left and right, refer respectively to scenario H and C, whereas absolute values of differences for a

[17] This leads to a 0.8% growth rate after 2008.

[18] The average growth rate of health care expenditure over this period was 3.5%, while the per-capita GDP average growth rate was 2.4%. Assuming stability of the ratio between these two growth rates implies a 1.4% increase of per-capita health care expenditure over the period 1990-2008 (the actual average per capita GDP growth rate being 0.9%) and 0.7% increase since 2009 (having assumed equality between the growth rate of per-capita GDP and incomes).

[19] All values reported in the paper are in 2008 euros.

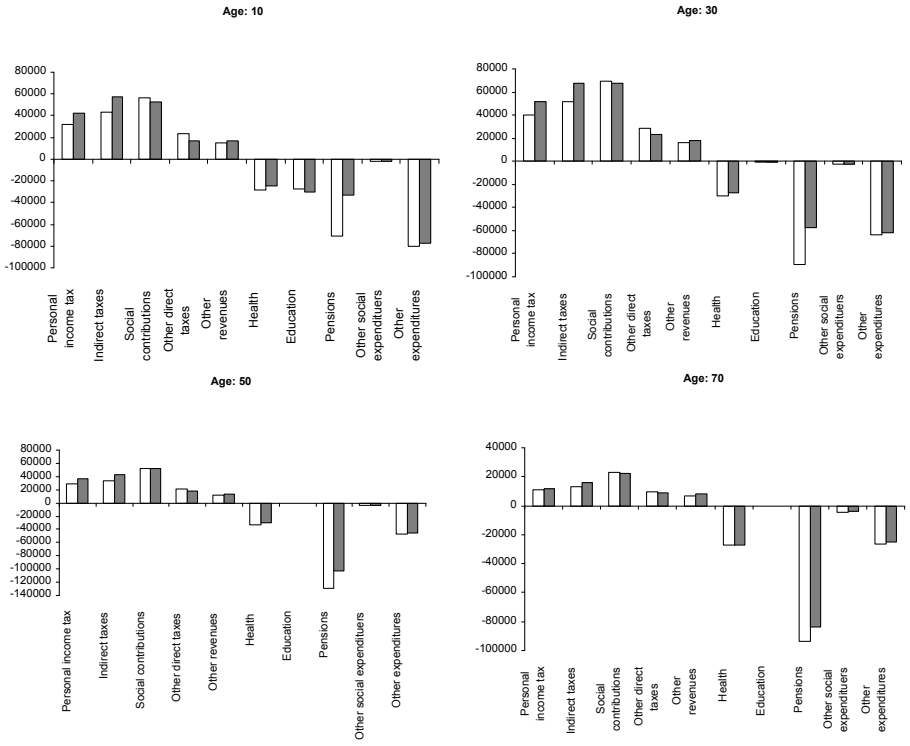
Figure 2: Net tax change for different cohorts (scenario C - H)



larger number of cohorts are presented in Table 1.
On the tax side, the present value of all taxes paid increases for all cohorts. The percentage increase is between 9% and 11% for cohorts aged up to 50. Figure 3 shows that this is mainly due to a relevant increase (around 30% for cohorts aged up to 40) in personal income tax (Irpef). It is difficult to refer this to any specific policy change, because several minor interventions were implemented during the years. This result is consistent with those of other analyses[20] which show that overall there was an increase in the incidence of the personal income tax, as a result of the government retaining revenues due to inflation interacting with a progressive tax scheme (fiscal drag). The composition of the other government revenues changes, with an increase in indirect taxes compensating for the reduction in social contributions and other direct taxes. This reflects the introduction of Irap in 1998, a tax (classified as indirect) which replaced the component of social contributions that was previously a source of funding for the National Health System, and a number of other minor taxes (mainly direct). The net effect of the recomposition at the individual level is limited for all cohorts. Finally, the increase in "other revenues" reflects the use of additional one-shot taxation to avoid a financial crisis in 1992 and to enter the European Monetary Union in 1998 (Marino et al., 2009).
Figure 3 shows that, independently of age, transfers are lower (in absolute value) under scenario C than under H, the only exception being "education" in the top-left panel, as a result of the aforementioned increase in participation to university education. Several interventions aimed at the containment of health care expenditure, and the reform of the organization of the National Health Service introduced between 1992 and 1999 can explain the reduction of the in-kind ben-

[20] See for example Marino et al. (2009).

Figure 3: Net present value of different tax and transfer programmes under scenarios C and H



efit related to health care, which is experienced by all generations. In percentage terms the impact is greater for young individuals (15% for the newborns, corresponding to 7,183 euros) than for older ages (6% at 60, corresponding to 3385 euros). This is unlikely to be a result of any specific regulation, but rather the effect of shift of health care expenditure towards higher ages, which took place between 1990 and 2008 as a result of increased life expectancy. This is only captured by scenario C, for which actual profiles are used for those years, in contrast to scenario H for which the profile is kept constant over the whole time horizon.

Consistently with the discussion in Section 3, Figure 3 shows that the most relevant impact is related to the change in pension entitlements introduced by the two main reforms. This is clearly reflected in the size of the difference between the present value of pensions received under scenario C and H. Both the size and the variability across generations are striking in this case. The present value of pension transfers is more than halved for young generations, with cuts around 50% for all those aged 20 or less (i.e. not older than G2), which basically

corresponds to the cohorts whose pension benefits will be entirely calculated according to the new rules. The loss rapidly falls moving towards older cohorts (11% at 70), as the number of individuals within the cohort that benefit, at least partly, of the more generous pre-reform system increases[21]. Overall, the results of the present exercise confirm the central role of pension reforms in determining the intergenerational differences arising from the analysis in Section 3.

4.3 Intergenerational equity

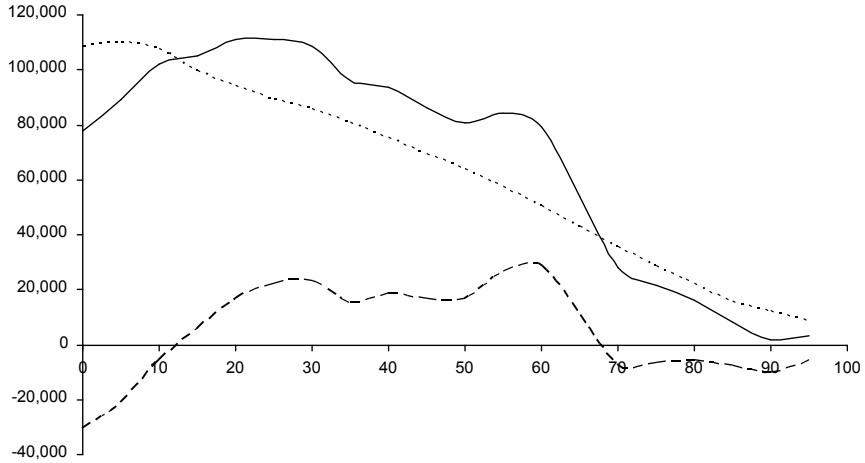
Several approaches to the definition of intergenerational equity may be adopted. One could define as equitable an equal sacrifice over the residual lifetime horizon for all living generations. The benchmark in this case would be a horizontal line in Figure 2. However, this would imply treating in the same way individuals with different residual time horizons, thus imposing on each cohort a price whose size is increasing in age. A more sensible approach to intergenerational equity might require that the same price per year is paid by all living generations. This benchmark is illustrated by the dotted line in Figure 4, and it corresponds to the introduction of a lump-sum tax on scenario H, whose size is such to replicate the consolidation results obtained under scenario C (in particular, with respect to the difference between the net tax of newborns and future generations). The dashed line in the figure shows for each cohort the difference between the actual sacrifice under scenario C, and the "lump-sum" burden. Figure 4 and its relationship with the results in Section 3 must be interpreted bearing in mind an important difference between the approach based on equality of residual lifetime horizons (Section 3) and the present analysis where they are different for each cohort. This plays a major role when the impacts of a policy are restricted to a portion of the life-cycle. When residual lifetime horizons have equal length as in Section 3, the time lag between the base year and the time when the policy produces its effects is the same for all generations under comparison. Since this is no longer true when the approach is the one adopted in this section, the discounting mechanism implies increasing weights for the same event as the distance in time between the base year and the year(s) when the relevant event occurs is reduced.

Individuals aged less than 12 and more than 69 paid less than they should have done under "lump-sum" consolidation, whereas the reverse is true for ages in between. This is consistent with the centrality of the role of pension reforms in the consolidation process, given that comparative advantages seem to be enjoyed by cohorts that in 1990 where either already retired or very far from retirement. At these ages the yearly net payment tends to be negative because of the prevalence of the use of public services such as health care and education[22]. Hence,

[21] Similar results were obtained by Sartor (2001).

[22] We do not want to place much emphasis on the comparative low price imposed on very young cohorts for at least two reasons. First, since the first years of life are characterized by a minor interchange between individuals and the public sector, whereas the main events such as the payment of personal income taxation and pensions are rather far in time and thus less important due to the operation of the discounting mechanism, few instruments are available

Figure 4: Comparison with consolidation obtained through a lump-sum intervention



the results confirm that, with the relevant exception of pensions, consolidation involved only limited, if any, role of social expenditure cuts. Even looking at cohorts that paid a comparatively large price for consolidation, the shape of the dashed line in Figure 4 confirms the prominent role of pension reforms. The figure shows two peaks corresponding to ages around 30 and 60, which correspond respectively to cohorts for whom all of the new pension rules will be in operation, and those that were close to retirement but not retired (at least fully) yet. What changes with respect of the results commented in Section 3 is the relative size of sacrifices imposed on these cohorts. In this case, the operation of the discounting mechanism implies a comparatively large "excess burden" for generations close to retirement at the time when reforms were introduced.
Even though the analysis in Section 3 may have advantages in terms of homogeneity in the comparison, this difference in the relative size of the burden of pension reforms deserves some further consideration. Differences in the discounting weights across generations may in fact be somehow related to economically more interesting differences, such as more opportunities to revise saving-consumption profiles over the life-cycle for younger generations. Moreover, consistently with the GA literature, underlying the analysis in Section 3 is a concept of intergenerational equity based on the idea that each generation should pay its own way (Barrell and Weale, 2010). However, different approaches could be adopted,

to the public sector to impose a sacrifice on these cohorts. Second, since some data, such as those on consumption and hence on indirect taxation, are only available at the household level the estimate of average taxes and transfers for these cohorts are sensitive to the choice of the household consumption model.

as, for example, fairness from the perspective of a social planner. In this case different residual lifetime net tax rates could be consistent with intertemporal social welfare maximization. Whether the difference between tax rates faced by G1 and G2 as estimated in Section 3 may be consistent with maximization of any reasonable form of intertemporal social welfare function might be the object of future research.

5 Conclusion

Similarities between the situation faced by Italy during the 1992 financial crisis and the present urgency to contrast the impact of the global crisis on public finances are apparent. In 1992 Italy started a consolidation process which took a further step with the efforts made later in the decade to meet the criteria for the admission to the first phase of the Europen Monetary Union. The contribution of that process towards consolidation was substantial, though still insufficient. Understanding which among living generations paid more for the past consolidation effort might prove useful to target future sacrifices in the perspective of intergenerational equity.

The paper employs the tools of generational accounting, but shifts attention from the typical comparison between current and future generations in the perspective of sustainability, to the investigation of equity among living generations with respect to the distribution of sacrifices implied by less generous fiscal policies undertaken since the '90s. We use actual data from several sources for the period 1990-2008 to obtain robust estimates of year-specific age profiles of the main tax and transfer programmes and standard techniques from the generational accounting literature for subsequent years.

In a first exercise we calculate net tax rates over homogeneous residual lifetime horizons, concentrating on three generations. Results show a dramatic increase in the tax rate of the generation born in 1970 (26%) with respect to the one born in 1952 (18%). The difference tends to disappear when the former is compared with the generation born in 1988, and more generally data seem to indicate substantial equity among generations born after 1970. In a second comparison we investigate the role of the shift towards a less generous fiscal regime since 1992 in determining intergenerational differences emerging from the first step. We show that fiscal policies actually implemented imposed a price on all living cohorts when compared with a hypothetical projection of the pre-1992 fiscal regime, involving both transfer cuts and tax increases. However, the distribution of the price across generations looks far from equitable. Pension reforms were unambiguously the main structural reforms on which consolidation was based, and their design deliberately introduced intergenerational discrimination. Different rules for benefit definition as well as minimum retirement age were introduced, whose generosity shows a strong inverse correlation with age. The price paid by younger generations to whom all the new rules apply is as large as 50% of the lifetime pension benefit. Since these cohorts approximately correspond to those born after 1970, we conclude that pension reforms introduced in the '90s are

central in explaining the sharp increase in lifetime tax rates faced by younger generations.

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Table 1: Changes in net present values (scenario C – H)

Age	Total	Personal income tax	Indirect taxes	Social cont.	Other direct taxes	Other revenues	Health	Educ.	Pensions	Other social exp.	Other exp.
0	43,171	7,422	10,491	-2,570	-4,838	1,160	3,991	-5,915	31,247	55	2,128
5	49,543	8,679	12,346	-3,004	-5,633	1,380	4,052	-6,020	35,506	64	2,173
10	56,618	9,732	14,100	-3,300	-6,273	1,807	3,931	-2,940	37,351	67	2,142
15	58,365	10,559	14,498	-3,015	-6,200	2,230	3,527	-764	35,431	65	2,033
20	61,632	11,393	15,988	-2,343	-5,982	2,572	3,329	-52	34,692	70	1,966
25	61,778	11,698	16,095	-1,747	-5,644	2,476	3,115	84	33,725	77	1,899
30	60,404	11,616	15,385	-1,251	-5,266	2,404	2,859	16	32,703	88	1,850
35	53,297	10,908	14,490	-840	-4,736	2,307	2,596	0	26,691	99	1,782
40	52,178	9,747	12,980	-568	-4,146	2,203	2,515	0	27,625	110	1,711
45	47,991	8,263	11,136	-429	-3,538	2,083	2,036	0	26,686	127	1,627
50	44,771	6,673	9,582	-421	-2,979	1,970	2,199	0	26,010	189	1,548
55	46,840	4,995	8,074	-498	-2,427	1,833	1,889	0	31,213	308	1,453
60	43,946	3,392	6,256	-594	-1,887	1,665	1,881	0	31,476	416	1,342
65	29,952	2,074	4,671	-650	-1,394	1,476	2,347	0	19,772	437	1,219
70	15,555	1,139	3,207	-599	-946	1,265	-18	0	10,071	352	1,084
75	12,076	603	2,275	-391	-545	1,035	2,522	0	5,428	224	925
80	8,888	339	1,198	-58	-162	785	1,522	0	4,415	129	720
85	4,628	146	382	130	-12	536	897	0	2,006	68	475
90	978	0	615	0	0	374	515	0	-882	39	316
95	1,684	0	127	0	0	241	180	0	965	17	154