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GENERATIONAL ACCOUNTING: THE CASE OF ITALY

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Abstract

This paper considers the implications of the current course of Italian fiscal policy for existing and future generations of Italians. Italy has a very high debt-to-GDP ratio as well as a significant Social Security program. These aspects of fiscal policy would, by themselves, raise concerns about the size of the burden to be passed on to future generations. But the concern is compounded by the demographic transition under way in Italy. Like the United States, Japan, and most other western European nations, Italy is "aging" due to its low fertility rate. Unless this rate increases, the proportion of Italians aged 60 and over will rise during the next four decades from 20 percent to almost 30 percent. At the same time, the absolute size of the Italian population will fall by 27 percent. The implication of this aging process is that there will be relatively few young and middle-aged workers in future years to share the burden of the Italian government's massive implicit and explicit liabilities.

To determine the size of the burden slated to be passed on to future generations of Italians, we utilize a new technique for understanding generational policy -- generational accounting. This approach indicates a huge difference in the projected lifetime net tax treatment of current and future Italians, even after one accounts for the fact that future generations will pay more net taxes because of growth. Unless Italian fiscal policy is dramatically and quickly altered, future generations will be forced over their lifetimes to pay the government four or more times the amount that today's newborns are slated to pay given current policy. Such large payments may not be feasible, because they could exceed the lifetime incomes of those born in the future. If Italian generational policy is indeed on an unsustainable trajectory, those Italians who are now alive will ultimately be forced to pay much more than suggested by current policy.

Introduction

Generational accounting is a new technique developed by Auerbach, Gokhale, and Kotlikoff (1991) and Kotlikoff (1992) to study the effects of government fiscal policy on different generations.[1] It allows one to measure directly how much existing generations can be expected to pay, on net, to the government over their remaining lifetimes. The present value of the projected net payments by those now alive, together with 1) the government's net wealth and 2) the present value of the projected net payments by future generations, must cover 3) the present value of government spending on goods and services. Generational accounting uses this equation — the government's intertemporal budget constraint — to infer the likely burden to be imposed on future generations. Specifically, the technique involves projecting the present value of government spending, calculating the government's net wealth, and, as mentioned, estimating the present value of net payments to be made by current generations. The present value of payments required of future generations is then determined as a residual.

Generational accounting represents an alternative to deficit accounting for purposes of understanding generational policy. Conventional deficit accounting has been criticized on a number of grounds, including failure to account for implicit government liabilities, lack of adjustment for inflation and growth, failure to capture pay-as-you-go Social Security and related policies, and neglect of policies that redistribute fiscal burdens across generations through changes in the market price of assets.[2] Though many economists have suggested adjusting the deficit to deal with these and other shortcomings, deficit accounting has a fundamental problem for which no adjustment is available. That is, there is no economic basis for the tax and transfer labels that are attached to government receipts and payments.

Unfortunately, the deficit depends on which labels/words are chosen to describe these transactions, and as such, it is entirely arbitrary.

For example, the government is free to label workers' Social Security contributions "taxes" and retirees' Social Security benefits "transfers." Alternatively, it can call these contributions "loans" to the government while labeling retirees' benefits a "return of principal and interest" on these "loans," plus an additional "old age tax" that would be positive or negative, depending on whether the Social Security system was less than or more than actuarially fair in present value. Using the second set of words rather than the first to describe the same economic reality alters not only the level of the reported deficit, but also the sign of its changes over time. This is not an isolated example; every dollar the government takes in or pays out is arbitrarily labeled from an economics perspective.

Correcting the deficit for one or more of its alleged shortcomings does not, in the end, avoid its primary drawback — this labeling problem — and eventuate in the measure of a well-defined economic concept. Rather, it simply replaces one deficit based on arbitrary labels with another (see Kotlikoff [1989]).

Generational accounting deals naturally with all of the concerns that have been raised about deficit accounting. It considers inflation and growth, including growth stemming from demographic change. It puts implicit and explicit government liabilities on an equal footing and thus avoids the danger of missing most generational redistribution. Indeed, generational accounting captures all of the policies that alter the generational distribution of fiscal burdens. Most important, it provides the answer to a major economic question, namely, whether the current course of fiscal policy, unless modified, will necessitate future generations' paying a much larger share of

their lifetime incomes to the government than current generations. Thus, generational accounting exposes the generational imbalance in a nation's fiscal policy.

Italy represents one country whose citizens should be acutely concerned about such an imbalance. It has one of the most generous pay-as-you-go Social Security and welfare systems in the industrialized world. In addition, after Belgium, it has the highest official debt-to-GDP ratio. Finally, its fertility rate is very low, which implies that a declining number of citizens will be available to shoulder the government's huge implicit and explicit obligations.

This paper develops a set of generational accounts for Italy that indicate an extremely serious imbalance in its generational policy. Unless the Italian government makes dramatic changes, future generations will face lifetime net tax burdens four or more times larger than those facing Italians who have just been born. This estimate takes into account the fact that future Italians will have higher incomes because of economic growth.

The paper proceeds by first describing general features of the Italian fiscal system and Italian demographics. Section II introduces the method of generational accounting, and section III details the data used in our analysis. Baseline generational accounts for Italy for 1990 are presented in section IV, which also explores the sensitivity of the accounts to growth-rate, interest-rate, and fertility assumptions. The fifth section compares the Italian generational accounts with those for the United States. Section VI then examines the factors behind the highly significant imbalance in Italian generational policy. The seventh section considers alternative methods of equalizing the growth-adjusted fiscal burden on future and current Italians, while section VIII discusses the likely effect of such policy

initiatives on Italian national saving. The final section summarizes our findings.

I. Italian Fiscal Policy and the Italian Demographic Transition

Measured relative to GDP, the Italian government is much larger than its U.S. and Japanese counterparts, but is comparable to the governments of other continental European countries. As can be seen from table 1, total government budgetary expenditures as a share of GDP are in line with those of Germany and France, but are some 15 to 20 percentage points higher than in the United States and Japan. Italy's larger expenditure/GDP ratio is explained almost entirely by the greater importance of Social Security outlays (19 percent of GDP versus 12 percent and 10 percent in the United States and Japan, respectively) and of interest payments (9 percent of GDP versus 5 percent and 4 percent in the United States and Japan). The ratios of tax revenue and Social Security contributions to GDP, while higher than in America and Japan, are in line with those observed in Germany and far lower than in France.

Transfer payments to households and firms dominate the Italian government's budget: In 1990, Social Security and interest payments constituted 58 percent of total outlays, with public pensions taking the biggest bite (26 percent). Government wage and salary payments accounted for 24 percent of government expenditures, followed by interest payments at 18 percent. The public pension system is based on a pay-as-you-go scheme, with contribution rates and benefits varying for private and public workers. The Italian welfare system also covers other important aspects of life, such as universal health care assistance, unemployment compensation, and a heavily subsidized education system.

The Italian government raises revenue mainly through direct taxes and payroll taxes. In 1990, each of these sources generated 37 percent of total revenue. The most important direct tax is the progressive personal income tax, which is applied to all income sources except interest income. Interest income is taxed at a flat rate, currently 30 percent for bank deposits and 12.5 percent for government bonds. Capital gains are taxed at a favorable rate in the case of real estate and are virtually tax exempt in the case of stocks and shares. Corporate taxes are levied at a high nominal rate (more than 46 percent[3]), although generous depreciation allowances and a plethora of exemptions have reduced the effective tax rate, particularly for manufacturing industries. Relative to the United States, a substantial fraction of revenues (26 percent versus 18 percent) is collected through indirect taxation, particularly through the value-added tax (VAT) and taxes on petroleum products.

Since the mid-sixties, Italy's fiscal policy has been characterized by deficit spending. The absorption of government bonds into private portfolios has been eased by Italian households' high propensity to save, an underdeveloped financial market, and, until the mid-eighties, legal restrictions on capital movements. Prior to the 1980s, the growth of public debt had been damped by low — and often negative — ex post real interest rates. Since 1984, however, real interest rates on government debt have exceeded Italian growth rates, placing the growth of public debt on an unsustainable path. The Italian government has laid out several medium-term plans for halting the expansion of public debt, but their outcomes have repeatedly fallen short of official targets. Although the primary deficit has been shrinking since 1986, the nation has been unsuccessful in running a large enough primary surplus to keep interest payments from growing faster than the economy.

Over the coming decades, both the size and structure of the Italian population are expected to undergo substantial changes. Although the population has been growing, albeit slowly, in recent years, fertility rates have been below replacement since the 1970s, falling from 2.7 in the mid-sixties to 1.7 in 1980 and 1.3 in 1990. The latest figure is among the lowest in the industrialized world, and portends important changes in the size and distribution of the Italian population. Table 2 reports these projected changes based on two fertility assumptions. Under the first, the fertility rate gradually rises over the next decade to the level required for replacement of the population (around 2.1). Under the second, the rate moderately recovers from its current exceptionally low value, and from 1991 on remains at the European Community rate (around 1.6). The Italian population is projected to fall under both scenarios. Under the first assumption — replacement-rate fertility — total population shrinks by 8 percent by the year 2050 and 9 percent by the year 2200. Under the second assumption — fertility constant at the EC average value — the corresponding drop-off rates are 27 percent by 2050 and 84 percent by 2200!

Both fertility assumptions imply a rapid aging of the Italian population. Currently, 17 percent of Italian males and 23 percent of Italian females are aged 60 or older. By the turn of the century, the corresponding figures will be 20 percent and 26 percent under both fertility assumptions. And by 2030, more than 23 percent of Italian males and 29 percent of females will fall into this age group if the fertility rate rises to the replacement value. The corresponding figures will be 26 percent and 32 percent if the rate remains constant at the EC average value. Since a large fraction of the government's transfers are allocated to older age groups, the maintenance of current enti-

tlements implies that these demographic trends will put increasing pressure on government spending.

II. The Method of Generational Accounting

To clarify the method of generational accounting, we write the government's intertemporal budget constraint for year t as

$$(1) \qquad \sum_{s=0}^{D} N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} = W_t^g + \sum_{s=t}^{\infty} G_s \prod_{j=t+1}^{s} \frac{1}{(1+r_j)}.$$

The first term on the left-hand side of (1) is the sum of the present value of the remaining lifetime net payments of all generations alive at time t. Net payments refers to all taxes paid to and all transfers received from the government (including local government and independent government agencies such as the Italian Social Security system). The expression $N_{t,k}$ stands for the time t present value of remaining lifetime net payments of the generation born in year k. A set of generational accounts is simply a set of values of $N_{t,k}$ divided by $P_{t,k}$ (the generation's current population size in the case of existing generations, or initial population size in the case of future generations), with the combined total value of the $N_{t,k}$'s adding up to the right-hand side of equation (1). In calculating the $N_{t,k}$'s for existing generations (those whose $k \leq 1990$), we distinguish male from female cohorts, but to ease notation, we omit sex subscripts in equations (1) and (2).

The term $N_{t,k}$ is defined by

$$(2) \qquad N_{t,k} = \sum_{s=\max(t,k)}^{k+D} \bar{T}_{s,k} P_{s,k} \prod_{j=t+1}^{s} \frac{1}{1+r_j}.$$

In this expression, $\bar{T}_{s,k}$ stands for the projected average net payment to the government made in year s by a member of the generation born in year k. By a generation's average net payment in year s, we mean the average of payments made across all members of the generation alive in that year. These payments include income, payroll, and indirect taxes, less all transfers received, such as Social Security, welfare, and unemployment insurance. The term $P_{s,k}$ stands for the number of surviving members of the cohort in year s who were born in year k. For generations born prior to year t, the summation begins in year t. For generations born in year k, where k>t, the summation begins in year k. Regardless of the generation's year of birth, the discounting is always back to year t. In dividing the total present value of each generation's payments (the $N_{t,k}$'s) by its population size, we are, in effect, discounting for mortality. Dividing the term $P_{s,k}$ in equation (2) by the generation's base-year population size forms a survival probability.

Returning to the first term in equation (1), the index s in the first summation runs from age 0 to age D, the maximum age of life. The first element of this summation is $N_{t,t}$, which is the present value of net payments of the generation born in year t; the last term is $N_{t,t-D}$, the present value of remaining net payments of the oldest generation alive in year t, namely, those born in year t-D.

The second term on the left-hand side of (1) is the sum of the present value, as of time t, of net lifetime payments of future generations. The right-hand side consists of W^g_t, the government's net wealth in year t, plus the present value of government expenditures on goods and services. In the latter expression, G_s stands for government spending on public goods and services in year s, and r_j stands for the pre-tax rate of return in year j.

Equation (1) indicates the zero-sum nature of intergenerational fiscal policy. Holding the right-hand side of the equation fixed, a decrease in the present value of net taxes paid by existing generations (a decrease in the first term on the left-hand side) requires an increase in the present value of net taxes paid by future generations (an increase in the second term on the left-hand side).

To determine the aggregate present value of net payments required of future generations, we simply solve equation (1) for the second term on the left-hand side. While future generations, as a group, can be expected to pay this derived amount (given current policy), there are many ways of allocating the collective burden among them. To illustrate the size of the burden that will likely be imposed on future generations relative to current generations, we assume that the burden on each successive generation remains fixed as a fraction of its lifetime income. In other words, the absolute fiscal burden of successive generations is assumed to grow at the same pace as their lifetime incomes, which we take to be the growth rate of productivity.

The construction of generational accounts involves two steps. The first entails projecting each currently living generation's average taxes less transfers in each future year during which at least some of its members will be alive. The second step converts these projected average net tax payments into a present value using an assumed discount rate and taking into account the probability that the generation's members will be alive in each of the future years (i.e., we discount for both mortality and interest rates).

In projecting each currently living generation's taxes and transfers, we consider first its taxes and transfers in the base year — in this case, 1990. The totals of the different taxes and transfers in the base year are those reported in the Italian National Accounts. In these calculations, we employ

the same fiscal aggregates that underlie the conventionally calculated Italian general government deficit. These totals are allocated to different generations according to their age and sex distribution, based on the Bank of Italy's Survey of Households' Income and Wealth (SHIW) and ISTAT's Consumer Expenditures Survey (CES). Future taxes and transfers by age and sex are assumed to equal their 1990 values with adjustments for growth. The calculations presented here are based on yearly projections up to year 2200. Three different interest- and growth-rate assumptions have been made, centered around our base-case assumption of a 5 percent real interest rate and a 1.5 percent productivity growth rate.

As mentioned above, inferring the fiscal burden on future generations requires knowing not only the sum total of generational accounts of current generations, but also the government's initial net wealth position and the projected present value of its outlays for goods and services. While in principle a measure of total net wealth is required, we rely instead on an estimate of net financial wealth.[4] Since assessing the value of real, nonmarketable wealth is difficult, this estimate is derived in a manner consistent with the general government deficit reported in the National Accounts.[5] The present value of non-educational/non-health government spending is projected assuming that its future per capita level remains constant except for an adjustment for growth. We treat education and health spending differently from other government outlays. Since these expenditures represent purchases of goods and services by the government on behalf of specific age groups, we consider them as additional age-specific transfer payments. That is, our estimates of the present value of net payments by current generations exclude the projected value of education and health spending on these generations.

Taxes on capital income require special treatment because, unlike other assessments, they may be capitalized into the value of existing (old) assets. For example, consider an increase in the nominal capital income tax rate in the presence of a provision that permits firms to deduct their new investment from taxable income immediately. As described by Auerbach and Kotlikoff (1987) and others, this will lead to a fall in the market value of existing capital. Although owners of existing capital will suffer a loss, new investors will be unaffected. For buyers of existing capital, the decline in its price will just make up for the higher tax on the future income that it will earn. For buyers of new capital, the larger immediate deduction (the amount of the deduction is proportional to the tax rate) will compensate for the higher taxes levied on the future capital income earned.

In this example, it would clearly be inappropriate to charge the higher capital income tax against the generational accounts of new investors (who are typically young or middle aged) rather than against the generational accounts of the owners of existing capital (who are typically old). Instead, generational accounting ascribes to the owners of existing assets all inframarginal taxes capitalized in the price of their assets. As discussed at greater length in Auerbach, Gokhale, and Kotlikoff (1991), owners of existing assets can be viewed, from the perspective of generational accounting, as possessing assets valued at replacement cost (rather than at market value), but as owing a tax equal to the value of the inframarginal taxes capitalized into the market value of the asset.

III. Data Sources and Construction

Figure 1 reports the age and sex profiles for the appropriation account of the general government, as well as those relative to private net wealth,

income, consumption, and the propensity to consume out of wealth. Separate profiles are derived for males and females in each of the 91 cohorts. We obtain the relative profiles by benchmarking individual positions against that of a 40-year-old male.

In order to calculate the generational accounts, receipts listed in the general government appropriation account are broken down into taxes on capital, labor, and commodities, Social Security contributions, and other revenues. The aggregate amount of taxes on capital and labor income is determined by allocating total income tax revenue to capital and labor according to their shares of national income. We separate payments in the appropriation account into spending on health, education, pensions, unemployment benefits, household responsibility payments, other Social Security transfers, and other programs. The aggregate 1990 values of each of these different payments and receipts are then allocated by age and sex according to cross-section age-sex profiles, which are assumed to be constant through time except for an age-independent shift to account for economic growth. Thus, while relative receipts and payments across age groups do not vary over time, their absolute amounts expand at the economy's rate of growth.

Income and consumption profiles are computed from SHIW data. Since the survey records personal after-tax income, we derive the amount of labor taxes paid on these earnings by applying the methodology developed in Franco and Sartor (1990). The profile for Social Security contributions is derived by applying nominal Social Security tax rates to the estimated profile of gross-of-tax individual labor income taxes, taking into account the industry, type of worker, and region of work.

Revenue from direct taxes on capital is separated into marginal and inframarginal taxes, according to the methodology outlined in Auerbach,

Gokhale, and Kotlikoff (1991). The relevant tax parameters are calculated based on estimates and data reported in Giannini (1989). We estimate that inframarginal taxes represent 36 percent of total corporate tax revenue. Marginal and inframarginal taxes on capital are imputed to each member of the cohort in proportion to his/her holdings of gross wealth (excluding real estate).

We obtain the age and sex profiles for net indirect taxes by applying nominal consumption tax rates to each of the 185 goods surveyed in the ISTAT CES. In the case of excise duties, we derive the implicit rate of taxation by dividing the unitary tax by the average price of the good. Since the survey records household, not individual, consumption, it was necessary to impute total household consumption of each good to each member of the household. With the exception of consumer durables and those items whose consumption is age specific (such as toys or education fees), all consumption expenditures are imputed assuming that each family member receives an equal share. In the case of rent, the amount assigned to young household members (age 18 or less) is set equal to half the amount imputed to adults. Consumer durables are imputed only to adults.

On the benefit side, the age profiles for health expenditures are taken from hospital and ambulatory care utilization profiles and from pharmaceutical consumption profiles, as described in Franco (1992). For education, profiles are based on the Ministry of Education's data on expenditures per student at each educational level (from nursery school to college). Unemployment and short-term disability benefits and sick pay are imputed to citizens aged 20 to 59, assuming constant per capita payments. Maternity benefits are imputed to females aged 20 to 39, and severance pay provisions are imputed to citizens aged 55 to 65. In both cases, constant per capita payments are assumed. For

pensions, profiles are taken from the SHIW, while the profiles for households' "responsibility payments" are those estimated by Franco and Sartor (1990).[6]

IV. Baseline Generational Accounts and Sensitivity Analysis

Table 3 presents the baseline generational accounts for males and females at every fifth age for nine different combinations of growth and interest rates. Here we assume, perhaps optimistically, that in the year 2000 the Italian fertility rate will reach the level required to stabilize the population (the replacement-rate fertility assumption of table 2). All amounts are in 1990 dollars.[7]

The accounts indicate the average amount an individual in the specified age-sex group will pay in net taxes over the rest of his/her lifetime. For example, assuming a real interest rate of 5 percent and a growth rate of 1.5 percent, the projected present values of net payments of 40-year-old males and females are $95,500 and $6,300, respectively. Females pay much lower labor income and Social Security taxes because they earn less. Notice that males aged 50 and over and females aged 45 and older have negative generational accounts. Hence, they can expect to receive, in present value, more in future transfers than they will pay out in taxes. The size of the generational accounts first rises and then falls with age, reflecting the fact that young children are years away from their peak tax paying years, whereas older individuals are in or near their retirement years, when they are on the receiving end of the government's tax and transfer programs.

To better understand the numbers in table 3, consider table 4, which decomposes the generational accounts into the present values of each of the various tax payments and transfer receipts. In the case of 40-year-old males, their generational account of $95,500 represents the difference between

$224,500 in the projected present value of future taxes and $129,000 in the projected present value of future transfers. For 40-year-old females, their $6,300 reflects $129,600 in projected taxes in present value less $123,300 in projected transfers in present value. The largest payment item for males of this age is Social Security contributions, while for females it is labor income taxes. On the receipt side, the largest component for both sexes is Social Security pensions.

In addition to detailing the remaining lifetime payments of current generations, table 3 indicates in the next-to-last row the payment required of the generation born in 1991, assuming that it, as well as every future generation, pays an equal amount after an adjustment for growth. If the Italian government's fiscal policy were generationally balanced, the per capita net payment of those born in 1991 would equal the amount 1990 newborns pay times (1+g), where g is the growth rate. The last row in table 3 indicates the percentage difference between the 1990 newborns' net payment times (1+g) and the net payment of those born in 1991, under our illustrative assumption of equal growth-adjusted treatment of future generations. Note that in calculating the burden on generations yet to come, we assume that the ratio of the burdens on future males and females is the same as the ratio of the generational accounts of newborn males and females; i.e., we assume that in the future, males will be treated by the fiscal system relative to females in the same manner as newborn males are slated to be treated relative to newborn females.

Comparing the first and next-to-last rows in table 3 reveals a huge imbalance in the generational stance of Italian fiscal policy. For the nine combinations of interest- and growth-rate assumptions, the percentage difference in the treatment of future generations compared to those born in

1990 ranges from 173.6 percent to 604.2 percent. This means that, depending on assumptions, future Italians will pay, in present value, somewhere between 2.7 and 7.0 times the amount that newborns are expected to pay given current policy. Under our base-case assumptions of a 5 percent real interest rate and a 1.5 percent rate of growth, subsequent generations will pay almost four times what 1990 newborns do.

As the table indicates, the values one assumes for the interest rate and growth rates have an important effect on the size of the generational accounts, as well as on the extent of the generational imbalance. The higher these interest and growth rates are, the larger the absolute value of the generational accounts. Higher interest rates increase the percentage difference in the accounts of current and future newborns, while higher growth rates do the opposite.

Although the generational policy imbalance indicated in table 3 is extremely large, it may, nonetheless, represent an *underestimate* of the problem for the following two reasons. First, the pension system has not yet reached full maturity. Second, the figures in table 3 are based on the replacement-rate fertility assumption. If we instead calculate the burden on future generations assuming a nearly constant fertility rate (to be precise, constant age-specific fertility rates), the percentage difference in the net lifetime payments of future and newborn Italians rises from 292.5 percent to 365.9 percent. Note that changing the assumption about future fertility leaves the generational accounts of current generations unchanged.

V. Comparing Italian and U.S. Generational Accounts

It is instructive to compare the Italian base-case generational accounts with the U.S. generational accounts computed under the same interest- and

growth-rate assumptions. Table 5 does just this, highlighting a number of interesting differences. First, the generational policy imbalance is much smaller in the United States. The percentage difference in the treatment of future generations relative to current newborns is 292.5 percent for Italy, but only 28.6 percent for the United States. Future Italian males (females) will pay $259,500 ($56,300), compared to $104,100 ($14,100) for future American males (females).

While future Italians will pay more, young and middle-aged Italians are slated to pay less than their American counterparts. In the case of 40-year-old American males, the remaining lifetime net tax bill is more than twice the corresponding bill for 40-year-old Italian males. The larger Italian generational imbalance is also reflected in the age at which net payments break even (that is, the age at which gross payments to the government equal benefits received). In the case of both Italian males and females, the break-even ages are 10 years less than those for their American counterparts. This phenomenon is largely explained by the greater generosity of the Italian pension system relative to that of the United States. Compare, for example, the $-111,200 generational account of 70-year-old Italian males with the $-49,000 generational account for American males of like age.

A final interesting difference between the Italian and American generational accounts is the situation of males relative to females. While Italian policy provides older females with higher net payments than does American policy, it extracts somewhat larger net payments from younger females and much higher net payments from future females.

VI. Understanding the Generational Imbalance in Italian Fiscal Policy

Much of the generational imbalance in Italian fiscal policy reflects the pending demographic transition. Under our base-case interest- and growth-rate assumptions, the percentage difference in the treatment of future and newborn Italians falls by more than half (126.8 percent compared with 292.5 percent) if the population is assumed to experience no demographic change. By no demographic change, we mean that the number of people in each age-sex group in future years equals the corresponding 1990 population figures.

A second important factor in explaining the generational imbalance is the high level of Italian debt relative to GDP. As mentioned in section I, Italy's public debt has been on an unsustainable path since the mid-eighties. Blanchard et al. (1990) estimate that the gap between the actual primary balance and the level required in 1989 to avoid a debt-to-GDP runaway was equal to 5.2 percent of GDP. We estimate the effect of this tremendous shortfall on Italian generational accounts by assuming, counterfactually, that the Italian debt is zero. In this case, the percentage imbalance in generational policy declines from 292.5 percent to 189.2 percent, indicating that while the government's debt accounts for about one-third of the imbalance in generational policy, most of this imbalance has nothing to do with *officially labeled* government debt. Thus, focusing solely on debt can be highly misleading for assessing a government's generational policy.

A third critical factor underlying the generational imbalance in Italian fiscal policy is the scale of the Social Security system. To see the importance of Social Security, suppose that pension benefits were immediately and permanently reduced by 20 percent. In this case, the generational imbalance would decline by nearly half, from 292.5 percent to 153.3 percent.

Table 6 summarizes the effects of these three counterfactual experiments on Italy's generational policy imbalance. It also considers alternative combinations of the three. If any two of the three experiments are combined, the 292.5 percent generational imbalance falls, but only to between 50.6 percent and 60.1 percent. Thus, the generational policy imbalance is so great that even two dramatic reversals of circumstances cannot close the gap between the fiscal treatment of current and future newborns. If, on the other hand, all three experiments are combined, the gap is closed; indeed, it is more than closed, as future generations end up paying 12.4 percent *less* than current generations.

The imbalance in generational policy exposed here has been partially explored in a number of recent studies considering the future finances of the Italian Social Security system. In 1986, the Treasury's Technical Committee on Public Expenditure projected a substantial rise in the theoretical equilibrium Social Security tax rate (i.e., the ratio of total pension benefits to total income, subject to pension contributions) for the Employee Pension Fund (see Franco and Morcaldo [1986]). Recent estimates by the National Institute for Social Security (INPS [1991]) and the State Accounting Office (Ragioneria Generale dello Stato [1991]) concur on the seriousness of the problem. INPS projects the rate to rise from 39.5 in 1990 to 45 percent in 2010, while the State Accounting Office pegs the rate at 48 percent in 2010 and 57 percent in 2025.

VII. Alternative Tax Policies to Restore Generational Balance

An alternative way to understand the magnitude of Italy's generational imbalance is to consider how much alternative tax rates would need to be raised to restore balance. For example, it would take an immediate and

permanent hike in the average labor income tax rate from its current value of 12.4 percent to *21.4 percent* to accomplish this. As indicated in the first column of table 7, an increase of this magnitude raises the generational accounts of all current generations. For middle-aged males, net lifetime payments rise, in present value, by between $30,000 and $60,000. For middle-aged females, the increase ranges from $20,000 to $35,000. The large additional payments of these and other currently living generations permit a significant decline in the fiscal burden of future generations, with males paying $161,700 less and females paying $19,200 less.

Of course, raising labor income taxes is not the only way to restore generational balance. Columns two, three, and four of table 7 show the changes in generational accounts if Social Security contributions, capital income taxes, or indirect taxes are raised instead. While the impact on future generations is similar regardless of which tax is increased, the distribution of the additional burden across current generations is quite sensitive to the choice of tax instrument. Compare, for example, rectifying the imbalance by raising Social Security taxes with the alternative of increasing capital income taxes. For Italians aged 60 and over, the former policy involves a very small increase in their remaining lifetime payments, while the latter results in a significant rise. This difference simply reflects the fact that older Italians are, in the main, retired and subject to low Social Security taxes. On the other hand, they pay a significant percentage of capital income taxes, reflecting their considerable share of total Italian wealth.

Since an immediate and permanent increase in tax rates that restores generational balance seems unlikely, table 8 explores more realistic — though still quite painful — initiatives that would close the gap between the treat-

ment of future and current generations. The table shows the change in generational accounts resulting from three different policies. The first involves an equal revenue switch from Social Security payroll taxation to indirect taxation.[8] The second involves a 63 percent increase in income tax rates for 10 years, which would lower the Italian debt-to-GDP ratio to about 0.6 by the turn of the century. (A debt-to-GDP ratio of this magnitude is one of the requirements proposed by the EC for participation in the European monetary union.) The third policy involves a gradual reduction in Social Security pension benefits.[9] Under this scheme, pensions would ultimately be lowered by 20 percent, but the reduction would occur over a 10-year period, with benefits being cut by 2 percent per year.

The first policy, replacing Social Security payroll taxation with indirect taxation, has little effect on the percentage difference in the treatment of future and newborn Italians, but redistributes substantial sums between males and females. Males currently pay a much larger percentage of total payroll taxes than do females, reflecting their larger share of total labor earnings. In contrast, the male share of indirect tax payments is quite close to the female share. Hence, switching from payroll to indirect taxes moves the fiscal system away from a tax paid primarily by males toward one paid by both sexes. For 40-year-old males, this "revenue-neutral" change in tax bases reduces their remaining lifetime net tax bill by $37,500, while it increases the bill of 40-year-old females by $26,700. Future males also benefit greatly from this provision, but the gain to future generations of Italians is almost completely offset by the loss to future females.

The second policy, cutting the ratio of public debt to GDP from 0.9 to 0.6, reduces the percentage difference in the treatment of future and newborn Italians by raising the net payments of all those currently alive, with the

exception of newborns. The percentage gap in the treatment of future and newborn generations is reduced from 292.5 percent to 204.7 percent, with the adjustment mainly borne by middle-aged individuals, who are close to their peak income tax paying years.

The third policy, gradually cutting Social Security benefits by 20 percent, is more effective than the previous one in reducing intergenerational imbalance. Furthermore, its intragenerational effects are different in that it redistributes substantial sums from older Italians toward younger and future citizens. The percentage gap in the treatment of future and newborn generations is reduced from 292.5 to 170.4 percent, with 60-year-old males paying $22,900 more and 60-year-old females paying $19,900 more. The growth-adjusted benefit to future males is $68,100; for future females, it is $6,200.

VIII. The Impact of Alternative Tax Policies on National Saving

This section considers the likely impact on national saving of the various fiscal policy experiments described in the previous section. Specifically, for each policy, we first multiply each living generation's marginal propensity to consume out of lifetime resources by the projected policy-induced change in its account. We then sum these products across all living generations to determine the aggregate change in consumption.

Let Xc_k be the marginal propensity to consume out of lifetime wealth for a typical member of the generation born in year k, and let $\Delta N^j_{t,k}$ represent the present-value change induced by policy j in the remaining lifetime net payments of the generation born in year k (where j ranges from one to seven, corresponding to the policies described in tables 7 and 8). Then the effect on national saving at time t, when the policy is implemented, is equal to

$$\Delta S^j = \sum_{s=0}^{D} Xc_s \Delta N_{t,t-s}.$$

That is, the increase in national saving is equal to the reduction in the consumption of all generations alive at time t.

To compute the marginal propensities to consume out of lifetime resources, we first estimate lifetime wealth for each individual born in year k. Our methodology is outlined in the appendix. Under the assumption of homothetic preferences, marginal and average propensities coincide and are estimated by the average ratio of current consumption by each individual in an age/sex cohort to his/her lifetime resources. The last rows of tables 7 and 8 report the net national saving rate, as a percentage of net national income, induced by the corresponding policy. Recall that the net national saving rate in 1990 was around 8.6 percent. Hence, the effect of the policies represented in these tables is to more than double that rate.

The four policies described in table 7 call for reducing living generations' consumption by between 10 and 12 percent — a considerable sacrifice. However, since the various policies are differently distributed across age and sex, they also have different implications for the level of total current consumption and national saving. Restoring generational balance through either indirect taxation or raising taxes on capital has the largest impact on national saving, while increasing Social Security contributions has the smallest.

The policies described in table 8 have a less significant impact on national saving. In the case of switching from Social Security taxation to

indirect taxation, national saving in the initial year increases by 2.3 percentage points. It rises by 4.4 percentage points if Social Security benefits are reduced by 20 percent over 10 years, and by 3.6 percentage points if the debt/GDP ratio is scaled back to 0.6 over 10 years.

IX. Summary and Conclusion

A serious imbalance exists in Italy's generational policy. Unless major and quite painful steps are taken soon, future generations of Italians will be forced to pay over their lifetimes four or more times the net taxes expected to be collected from current young Italians. This generational imbalance reflects the combination of an explicit liability to service huge amounts of government debt and an implicit liability to pay substantial sums to existing generations in the form of pension and health benefits. Were there a large projected number of future Italian workers to share these burdens, the liabilities would be less troubling. But the Italian population is rapidly aging and declining.

A large variety of measures can be used to bring Italian fiscal policy into generational balance. For example, the government could raise income taxes. The current average rate of taxation on total income (capital plus labor income) is 14 percent. To bring Italian policy into generational balance would require immediately and permanently raising the average income tax rate to 23 percent. Precisely which fiscal measures are taken and how quickly they are implemented will determine how the burden of adjusting to generational balance will be distributed over different generations. One thing is clear, however. The longer the delay in making the adjustment to a balanced course of policy, the larger will be the generational imbalance that needs to be addressed. In our base-case calculations, future generations will

pay four times more than today's newborns if all the adjustment is forced on the former. But this calculation assumes that those born in the immediate future will share in the larger lifetime net tax burden. Suppose, instead, that the next 10 generations of Italians are let off the hook and treated in the same manner as current newborns are projected to be treated. Then those born after the turn of the century will be left with a growth-adjusted lifetime net tax bill that is five rather than four times larger than the bill facing current newborns.

Even a four-times larger lifetime generational account for future generations may be infeasible, however, since the required net payments may exceed the present value of these generations' labor earnings. If this is indeed the case, then policy will have to be adjusted in a manner that raises the lifetime net payments of Italians now alive.

FOOTNOTES

[1] See also Auerbach, Gokhale, and Kotlikoff (1992a and 1992b).

[2] Consider a policy that lowers the market price of an asset, such as a tax on land. Since the sellers of land are, on average, older generations, while the purchasers of land are, on average, younger generations, such a policy redistributes between the old and young. The physical land itself is unchanged, but the old are forced to sell their holdings at a lower price, benefiting the young purchasers.

[3] The corporate tax rate was set at 47.826 percent in 1991.

[4] The derivation of a correct measure of nonfinancial wealth is an extremely complex task, as it involves adjusting the general government's appropriation account through the following steps:

i) Assessment of the market value of general government's real assets, including historic buildings and building sites as well as loss-generating public enterprises;

ii) Inclusion among current costs of the rents on those assets currently being used by general government (such as government buildings);

iii) Exclusion from revenues the profits, dividends, and other income currently earned on assets.

[5] More precisely, our measure of net financial wealth has been derived by capitalizing net interest payments (i.e., interest payments minus interest income) at the nominal before-tax interest rate levied on newly issued government bonds (currently around 12 percent). According to this measure, net debt in 1990 was equal to 77 percent of GDP.

[6] It should be noted that the Italian pension system has not yet reached full maturity. The ratio of the average pension benefit to per capita GDP is likely to increase significantly in the future.

[7] The exchange rate used for calculation was 1,257 lire per dollar.

[8] More precisely, the average indirect tax rate is increased to the level required to offset the revenue loss arising in the base year from the reduction in the Social Security tax rate. In the following years, revenue neutrality need not occur.

[9] As previously noted, the ratio of the average pension benefit to per capita GDP is likely to increase in the absence of policy action.

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Appendix

Estimation of lifetime resources and of the marginal propensity to consume

Lifetime resources at time t for an individual born in year k is the sum of nonhuman plus human wealth. Human wealth is defined to include not only the present value of after-tax future earnings, but also the present value of Social Security benefits; i.e., the level of pension wealth. Of course, for a retired individual, human wealth is equal to the value of pension wealth. To estimate lifetime resources, we use the 1989 SHIW, which contains information on the value of household net worth, earnings and pension income, and personal characteristics such as age, sex, years of education, and occupation.

The overall sample of income recipients (14,552 observations) is split into two parts. The first includes working persons over age 16 and below 60 (the retirement age is 55 for women); the second group includes retirees over age 60 (55 for women) and below 91 (maximum length of life) whose income derives only from Social Security benefits. The pension wealth of the last group is computed by taking the present value of Social Security benefits. Here, we assume that future benefit levels will remain constant at the currently observed value for each person.

To account for the rapidly increasing probability of death once average life expectancy has been reached, the discount rate in the computation of the pension wealth portion of lifetime resources is set equal to 12 percent.

For the first group, we estimate pension wealth following the previous procedure after setting the level of Social Security benefits at 80 percent of the projected earnings at age 60 (see below); the assumption is that all members of the male labor force retire at this age (55 for females). To compute the other portion of human wealth, we first fit a weighted least

squares regression of current earnings against a vector of demographic characteristics and a second-order age polynomial to allow for cohort effects (see table 9).

For an individual born in year k, the fitted value of earnings at time t is

$$Y_{t,k} = bX_k + a(t - k) + a_1(t - k)^2,$$

where X_k is the vector of characteristics of the specific individual aged t-k. Projected earnings j years ahead are computed as

$$Y_{t+j,k} = [bX_k + a(t+j-k) + a_1(t+j-k)^2] \ (1+g)^j,$$

where g is the productivity growth rate (1.5 percent per year). Thus, the present value of earnings is given by

$$H_k = \sum_{i=t-k}^{60} (1+r)^{(t-k)-i} \ y_{t+i-(t-k)},$$

where the discount rate, (1+r), is set at 1.05.

For each individual, lifetime wealth is then obtained by adding his/her human wealth and share of household net holdings of real and financial assets, according to the method of division defined in section III.

Individuals below age 16 are assumed to own only human wealth. This is computed by appropriately discounting their average human wealth at age 17 — the age at which they are assumed to enter the labor force. Thus, lifetime resources of 10-year-olds is given by $(1 + g)^7(1 + r)^{-7} H_{17}$, where H_{17} is the average value of the human wealth of 17-year-old workers.

We assume that young dependents (below 28 years) who have not yet entered the work force will start working within a year, and we impute to them the human wealth of workers who are a year older, with appropriate adjustments for growth and discounting.

Finally, given lifetime wealth and consumption for each individual in the sample, the average and marginal propensities to consume are computed by dividing each generation's consumption (imputed according to the methodology described in section III) by its average lifetime resources. The age pattern is shown separately in figure 1 for males and females.

Table 1

Comparative Fiscal Ratios in 1989

Ratio	Italy	U.S.	Japan	Germany	France
Taxes/GDP[a]	37.8	30.1	30.6	38.1	43.8
Total Outlays/GDP	51.7	37.3	32.1	45.2	49.5
Direct Spending/GDP[b]	20.3	20.1	15.4	21.0	21.5
Transfers/GDP[c]	21.4	12.6	12.6	20.4	25.0
Interest Payments/GDP	9.0	4.9	4.1	2.7	2.8
Deficit/GDP	10.1	1.7	-2.5	-.2	1.2
Net Debt/GDP	95.9	30.8	14.6	22.4	24.7
Social Security & Education/GDP[d]	24.0	17.3	14.8	24.1	28.4
Pensions/GDP	12.8	7.2	5.3	11.8	12.7
Health/GDP	5.4	4.4	4.8	6.4	6.8
Unemployment/GDP	.7	.4	.4	1.5	2.8
Education/GDP	5.1	5.3	4.3	4.4	6.1

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[a] Including Social Security contributions.
[b] Purchases of goods and services, including investment goods.
[c] Non-interest transfers on current account.
[d] 1985 data.

Source: Authors' calculations based on National Income and Product Accounts for various countries.

Table 2

Projected Size and Age-Sex Distribution of the Italian Population, 1990-2050

Fraction of Males in Specified Age Groups

	Replacement-Rate Fertility				Average EC Fertility			
Age	1990	2010	2030	2050	1990	2010	2030	2050
0-17	.230	.231	.231	.245	.230	.207	.186	.181
18-25	.133	.096	.106	.109	.133	.099	.089	.093
26-49	.339	.347	.296	.321	.339	.357	.317	.312
50-59	.122	.129	.132	.118	.122	.132	.147	.151
60+	.173	.196	.232	.205	.173	.202	.258	.262
Total Males (millions)	27.7	27.9	27.0	25.8	27.7	27.1	24.3	20.2

Fraction of Females in Specified Age Groups

Age	1990	2010	2030	2050	1990	2010	2030	2050
0-17	.206	.207	.209	.222	.206	.185	.166	.160
18-25	.121	.087	.096	.100	.121	.089	.080	.082
26-49	.320	.320	.271	.295	.320	.328	.288	.280
50-59	.123	.127	.127	.114	.123	.130	.140	.142
60+	.228	.258	.294	.267	.228	.265	.324	.333
Total Females (millions)	29.4	29.3	28.3	26.9	29.4	28.6	25.7	21.4

Source: Authors' calculations based on population projections obtained from the Banca d'Italia.

Table 3

Accounts for Age Zero and Future Male Generations

(thousands of dollars)

	g=.010			g=.015			g=.020		
Generation's Age in 1990	r=.04	r=.05	r=.06	r=.04	r=.05	r=.06	r=.04	r=.05	r=.06
0	78.3	52.8	33.7	94.0	65.1	43.0	111.2	79.1	53.7
5	96.4	70.0	48.8	111.9	83.0	59.3	128.3	97.3	71.0
10	131.6	105.6	83.3	146.2	118.6	94.4	160.9	132.5	106.5
15	181.5	158.1	136.8	193.7	170.0	147.6	205.5	182.2	159.0
20	212.5	194.3	176.4	221.2	203.8	185.7	228.9	213.0	195.0
25	212.7	201.4	188.7	217.2	207.5	195.4	220.3	213.0	201.8
30	185.5	181.6	175.0	185.8	184.1	178.7	184.3	185.6	181.8
35	143.5	146.7	146.4	139.8	145.6	146.9	134.3	143.3	146.7
40	90.4	99.7	105.1	83.5	95.5	102.7	74.9	90.0	99.4
45	32.2	46.0	56.0	23.2	39.4	51.2	12.7	31.7	45.6
50	-31.4	-15.0	-2.0	-41.4	-23.0	-8.4	-52.6	-31.9	-15.5
55	-99.4	-82.9	-69.1	-109.0	-91.1	-76.0	-119.4	-99.9	-83.5
60	-149.2	-135.5	-123.5	-157.0	-142.3	-129.6	-165.4	-149.6	-136.0
65	-143.0	-133.2	-124.5	-148.5	-138.1	-128.9	-154.3	-143.3	-133.5
70	-114.4	-108.0	-102.3	-117.9	-111.2	-105.2	-121.5	-114.5	-108.3
75	-86.9	-83.0	-79.4	-89.0	-84.9	-81.2	-91.2	-87.0	-83.1
80	-65.6	-63.4	-61.3	-66.8	-64.5	-62.4	-68.0	-65.6	-63.5
85	-48.3	-47.3	-46.3	-48.9	-47.8	-46.8	-49.4	-48.4	-47.3
90	-9.5	-9.5	-9.5	-9.5	-9.5	-9.5	-9.5	-9.5	-9.5
Future Generations	275.0	250.0	239.6	290.9	259.5	240.3	310.2	272.9	246.6
Percentage Change	247.9	368.6	604.2	205.1	292.5	451.2	173.6	238.2	350.3

Table 3 (continued)

Accounts for Age Zero and Future Female Generations

(thousands of dollars)

	g=.01			g=.015			g=.020		
Generation's Age in 1990	r=.04	r=.05	r=.06	r=.04	r=.05	r=.06	r=.04	r=.05	r=.06
0	17.4	10.5	3.8	20.1	14.1	7.2	21.4	17.5	10.7
5	25.7	18.5	10.7	28.3	22.4	14.7	29.1	25.9	18.8
10	49.6	42.8	34.6	51.5	46.7	39.0	51.3	49.8	43.1
15	85.6	81.0	73.9	85.9	83.8	77.8	83.8	85.6	81.2
20	103.5	102.9	98.8	101.4	103.9	101.2	96.8	103.5	103.0
25	96.9	101.0	100.9	92.0	99.6	101.4	84.6	96.6	101.0
30	70.2	79.1	83.2	62.8	75.3	81.6	52.9	69.8	78.9
35	35.3	48.3	56.2	25.8	42.3	52.6	14.0	34.8	47.9
40	-2.2	13.9	25.0	-13.0	6.3	19.7	-25.8	-2.7	13.3
45	-39.3	-21.5	-8.1	-50.7	-30.1	-14.6	-63.8	-40.0	-22.1
50	-77.2	-59.2	-44.8	-88.3	-68.0	-51.9	-100.7	-77.8	-59.8
55	-111.2	-94.5	-80.7	-121.1	-102.8	-87.6	-132.0	-111.8	-95.1
60	-129.4	-115.6	-103.9	-137.5	-122.5	-109.8	-146.1	-129.9	-116.1
65	-122.2	-111.8	-102.7	-128.1	-117.0	-107.3	-134.4	-122.5	-112.2
70	-104.4	-97.4	-91.1	-108.3	-100.9	-94.3	-112.4	-104.6	-97.6
75	-83.4	-78.9	-74.7	-85.9	-81.2	-76.8	-88.5	-83.6	-79.0
80	-64.6	-62.0	-59.6	-66.0	-63.4	-60.9	-67.5	-64.7	-62.1
85	-47.7	-46.5	-45.4	-48.4	-47.2	-46.0	-49.0	-47.8	-46.6
90	-7.6	-7.6	-7.6	-7.6	-7.6	-7.6	-7.6	-7.6	-7.6
Future Generations	61.0	49.6	27.1	62.3	56.3	40.1	59.7	60.5	49.4

Source: Authors' calculations.

Table 4

The Composition of Male Generational Accounts (r=.05, g=.015)

Present Values of Receipts and Payments

(thousands of dollars)

		Payments						Receipts				
Generation's Age in 1990	Net Payment	Direct Taxes Labor	Social Sec. Contr.	Indirect Taxes	Direct Taxes Capital	Seign.	Other Reven.	Pension Benefits	Health	Other Soc.Sec. Benef.	Househ. Respon. Paym'ts	Educa-tion
0	65.1	43.3	75.8	30.0	5.0	0.1	9.4	23.1	19.1	4.9	1.7	49.9
5	83.0	51.4	90.1	33.9	6.0	0.1	9.3	27.4	19.9	5.5	2.0	52.8
10	118.6	61.0	106.9	38.3	7.1	0.1	9.1	32.5	20.9	6.2	2.4	41.7
15	170.0	72.1	126.6	43.4	9.1	0.1	8.8	38.6	22.1	7.1	2.8	19.5
20	203.8	80.5	141.1	46.6	14.4	0.0	8.5	45.9	23.2	8.0	3.4	6.9
25	207.5	83.9	143.1	45.5	17.9	0.0	8.2	54.7	24.1	8.2	3.4	0.7
30	184.1	82.2	135.2	42.0	18.2	0.0	7.9	65.1	25.0	8.2	3.2	0.0
35	145.6	76.8	119.0	37.8	18.7	0.0	7.4	77.5	25.5	8.1	2.9	0.0
40	95.5	68.0	96.1	33.2	20.3	0.0	6.9	92.3	26.0	8.1	2.4	0.0
45	39.4	58.6	73.2	28.4	19.2	0.0	6.3	109.7	26.4	8.2	2.0	0.0
50	-23.0	46.5	49.5	23.5	18.3	0.0	5.7	130.2	26.3	8.3	1.6	0.0
55	-91.1	33.6	24.6	18.9	16.5	0.0	5.1	154.5	25.7	8.2	1.3	0.0
60	-142.3	22.9	3.8	15.2	16.0	0.0	4.4	172.6	24.5	6.3	1.1	0.0
65	-138.1	15.9	0.1	12.0	14.6	0.0	3.7	157.2	22.5	3.8	1.0	0.0
70	-111.2	11.3	0.0	9.8	11.5	0.0	3.0	124.0	19.7	2.5	0.8	0.0
75	-84.9	7.7	0.0	8.2	8.7	0.0	2.4	92.8	16.5	2.0	0.6	0.0
80	-64.5	4.5	0.0	6.4	5.7	0.0	1.9	67.6	13.2	1.6	0.5	0.0
85	-47.8	1.9	0.0	4.8	4.2	0.0	1.4	48.5	10.1	1.2	0.3	0.0
90	-9.5	0.2	0.0	1.2	3.1	0.0	0.4	11.5	2.5	0.3	0.0	0.0
Future Generations	259.5											

Table 4 (continued)

The Composition of Female Generational Accounts (r=.05, g=.015)

Present Values of Receipts and Payments

(thousands of dollars)

		Payments						Receipts				
Generation's Age in 1990	Net Payment	Direct Taxes Labor	Social Sec. Contr.	Indirect Taxes	Direct Taxes Capital	Seign.	Other Reven.	Pension Benefits	Health	Other Soc.Sec. Benef.	Househ. Respon. Paym'ts	Educa-tion
0	14.1	31.0	33.4	33.9	5.0	0.1	9.7	20.7	20.2	5.8	1.9	50.3
5	22.4	36.8	39.7	38.4	5.9	0.1	9.5	24.6	21.3	6.6	2.3	53.3
10	46.7	43.6	47.1	43.7	7.0	0.2	9.4	29.2	22.5	7.5	2.7	42.3
15	83.8	50.5	55.5	49.7	8.8	0.2	9.2	34.6	23.9	8.7	3.2	19.6
20	103.9	53.0	61.7	53.1	13.9	0.0	9.0	41.1	25.3	9.7	3.8	6.9
25	99.6	52.3	59.9	51.1	17.2	0.0	8.7	48.7	26.6	9.8	3.7	0.7
30	75.3	48.8	53.1	45.3	18.4	0.0	8.4	57.8	27.8	9.5	3.5	0.0
35	42.3	43.0	43.0	38.8	19.5	0.0	8.0	68.7	28.8	9.2	3.1	0.0
40	6.3	37.8	31.7	33.1	19.3	0.1	7.6	81.6	29.9	9.0	2.7	0.0
45	-30.1	32.5	21.6	28.3	18.6	0.1	7.1	96.1	30.8	9.0	2.2	0.0
50	-68.0	26.8	11.8	24.1	17.3	0.1	6.5	112.2	31.3	9.2	1.8	0.0
55	-102.8	21.3	4.5	20.5	15.8	0.0	5.9	129.0	31.1	9.1	1.5	0.0
60	-122.5	16.4	0.9	17.3	13.6	0.0	5.2	137.6	30.0	7.1	1.3	0.0
65	-117.0	12.9	0.1	14.3	12.0	0.0	4.5	127.4	27.7	4.4	1.1	0.0
70	-100.9	9.9	0.0	11.9	8.6	0.0	3.7	106.8	24.1	3.1	0.9	0.0
75	-81.2	7.3	0.0	9.9	7.5	0.0	2.9	85.5	20.2	2.4	0.7	0.0
80	-63.4	5.1	0.0	7.6	6.5	0.0	2.2	66.7	15.8	1.9	0.5	0.0
85	-47.2	3.4	0.0	5.5	4.7	0.0	1.6	49.1	11.7	1.4	0.3	0.0
90	-7.6	0.7	0.0	1.2	4.0	0.0	0.4	11.0	2.5	0.3	0.0	0.0
Future Generations	56.3											

Source: Authors' calculations.

Table 5

A Comparison of Italian and U.S. Generational Accounts

r=.05, g=.015

(thousands of dollars)

Generation's Age in 1990	Italian Males	American Males	Italian Females	American Females
0	65.1	80.9	14.1	10.9
5	83.0	100.7	22.4	19.5
10	118.6	137.4	46.7	44.6
15	170.0	187.7	83.8	76.7
20	203.8	218.9	103.9	101.7
25	207.5	244.2	99.6	109.3
30	184.1	236.4	75.3	104.9
35	145.6	217.6	42.3	95.7
40	95.5	198.7	6.3	81.6
45	39.4	168.1	-30.1	60.2
50	-23.0	117.1	-68.0	32.8
55	-91.1	65.5	-102.8	-.8
60	-142.3	10.9	-122.5	-36.3
65	-138.1	-40.0	-117.0	-66.3
70	-111.2	-49.0	-100.9	-70.2
75	-84.9	-46.0	-81.2	-65.1
80	-64.5	-38.4	-63.4	-55.3
85	-47.8	-29.6	-47.2	-44.9
90	-9.5	-1.5	-7.6	-7.4
Future Generations	259.5	104.1	56.3	14.1

Source: Authors' calculations.

Table 6

Understanding the Source of Generational Imbalance in Italian Fiscal Policy

Percentage Difference in Generational Accounts of Future Italians and 1990 Italian Newborns

	(1) Base Case	(2) No Demographic Change	(3) Zero Debt	(4) Lower Social Security Benefits
Percentage Difference	292.5	126.8	189.2	153.3

	(2) & (3)	(2) & (4)	(3) & (4)	(2) & (3) & (4)
Percentage Difference	59.3	50.6	60.1	-12.4

Source: Authors' calculations.

Table 7

Changes in Generational Accounts Required to Attain Generational Balance

(thousands of dollars)

	Tax to be Increased			
	Labor Income Tax	Social Security Contributions	Capital Income Tax	Indirect Taxes
Males				
Ages				
0	31.2	41.7	23.9	28.8
10	44.0	58.8	33.7	36.8
20	58.2	77.6	45.1	44.7
30	59.4	74.4	45.9	40.3
40	49.1	52.8	42.4	31.9
50	33.5	27.2	33.4	22.5
60	16.6	2.1	23.6	14.6
70	8.2	0.0	12.0	9.4
80	3.2	0.0	4.3	6.1
Future Generations	-161.7	-151.0	-169.1	-164.1
Females				
Ages				
0	22.4	18.4	23.6	32.5
10	31.5	25.9	33.2	42.0
20	38.3	33.9	44.5	51.0
30	35.2	29.2	46.0	43.4
40	27.3	17.5	41.0	31.8
50	19.3	6.5	32.0	23.2
60	11.9	0.5	21.3	16.6
70	7.2	0.0	11.6	11.4
80	3.7	0.0	5.9	7.3
Future Generations	-19.2	-23.3	-18.0	-8.9
Average Net Propensity to Save	18.9	18.1	19.6	19.3

Source: Authors' calculations.

Table 8

Changes in Generational Accounts Arising from Three Hypothetical Policies

(thousands of dollars)

	Switching from Social Security to Indirect Taxation	Reducing Debt/GDP Ratio to .6 Over 10 Years	Cutting Social Security Benefits by 20% Over 10 Years
Males			
Ages			
0	-22.8	.0	4.6
10	-39.2	2.7	6.5
20	-58.9	15.8	9.2
30	-61.2	23.7	13.0
40	-37.4	25.2	18.2
50	-8.1	22.4	24.5
60	23.1	12.8	22.9
70	17.3	7.5	11.8
80	11.2	3.3	4.4
Future Generations	-96.8	-58.1	-68.1
Females			
Ages			
0	26.4	.0	4.1
10	30.1	4.0	5.8
20	32.0	13.1	8.2
30	26.8	16.1	11.6
40	26.7	14.4	16.0
50	30.8	12.1	20.9
60	29.7	8.2	19.8
70	21.0	5.9	12.1
80	13.4	3.7	5.2
Future Generations	99.5	-12.6	-6.1
Average Net Propensity to Save	10.9	12.2	13.0

Source: Authors' calculations.

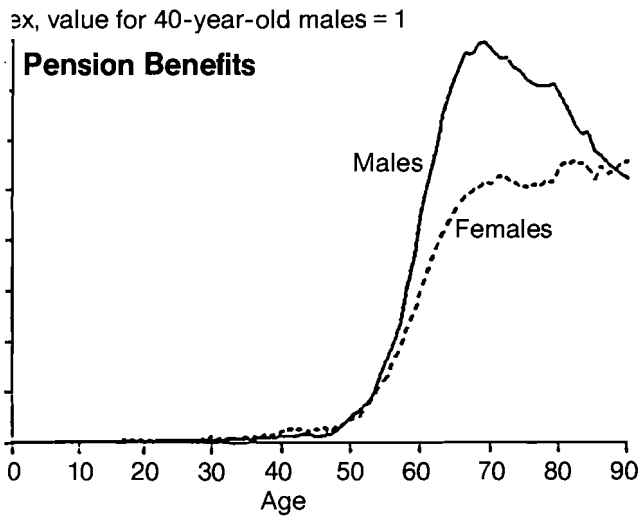
Table 9

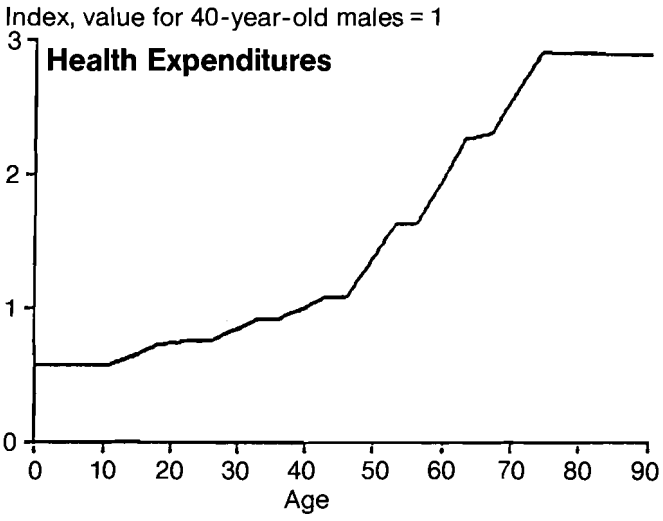
Earnings Function Estimates
(dependent variable: individual earnings[1])

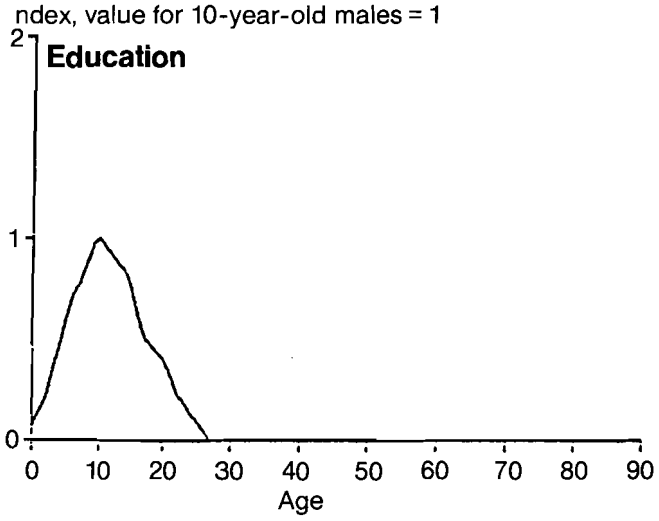
Variable	Coefficient	t-statistics
Education	379.7	4.6
Education squared	-3.1	-0.8
Age	554.6	14.2
Age squared	-5.7	-11.2
Male	3,240.8	21.5
Married	1,374.8	6.9
Occupation		
Operative and laborer	-4,716.3	-16.9
Clerical	-3,247.7	-10.4
Precision craft	886.1	1.7
Professional	5,398.8	8.1
Manager	11,418.7	8.9
Entrepreneur	21,005.9	9.8
Other	-7,338.2	-20.8
Sector		
Agriculture	-4,740.8	-15.5
Industry	33.2	0.1
Services	-119.2	-0.4
North	1,192.1	6.3
South	-707.8	-3.9
Constant	2,905.8	3.2
Adjusted R^2	.78	
Standard error	507.7	
Dependent variable mean	30,633.3	
No. of observations	9,290	

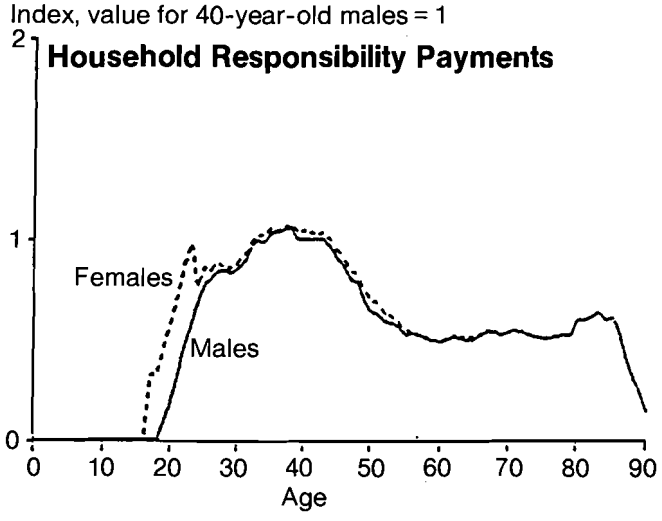
[1] The equation has been estimated by weighted least squares using the fitted values of an OLS first-stage regression as weights. The sample of 9,290 observations excludes individuals with zero labor earnings, those not in the labor force, and those older than 65. The dependent variable is expressed in thousands of 1989 lire.

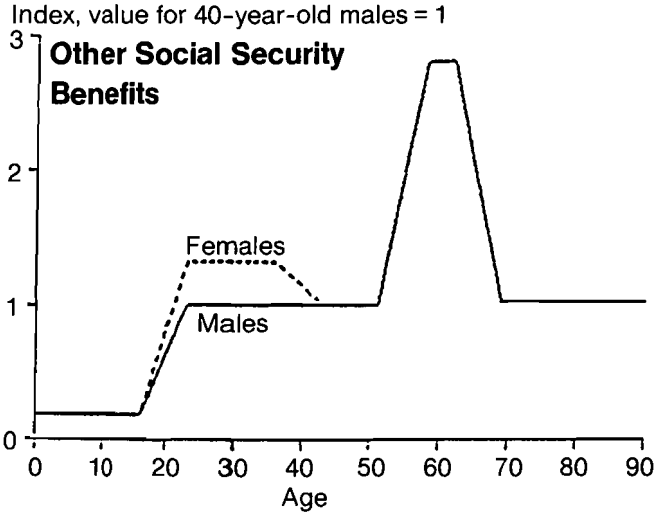
Figure 1: Age and Sex Profiles

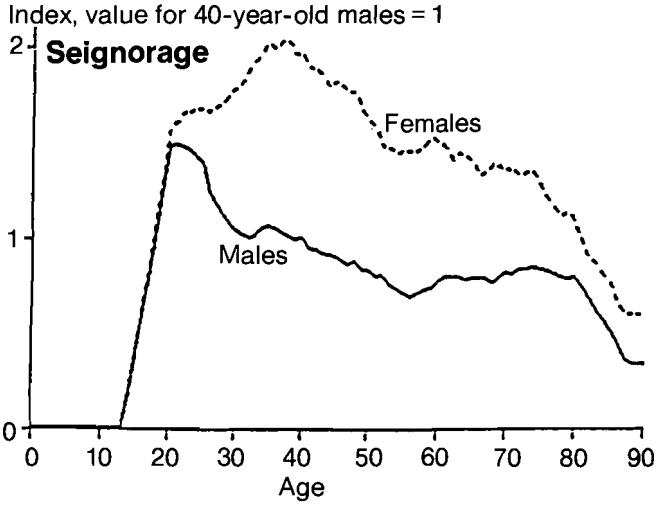












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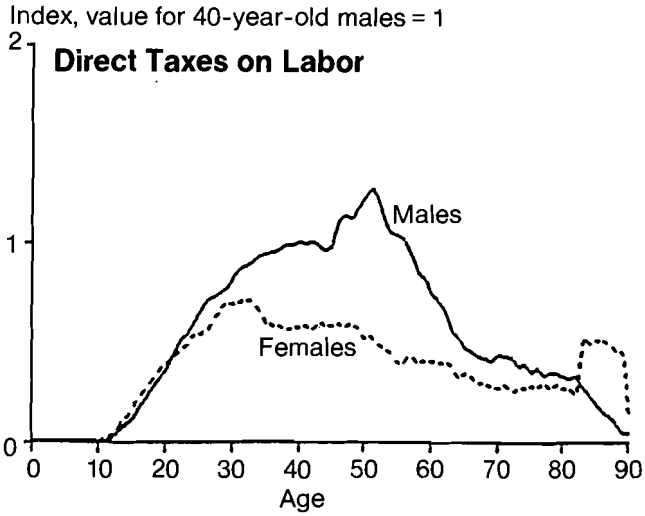

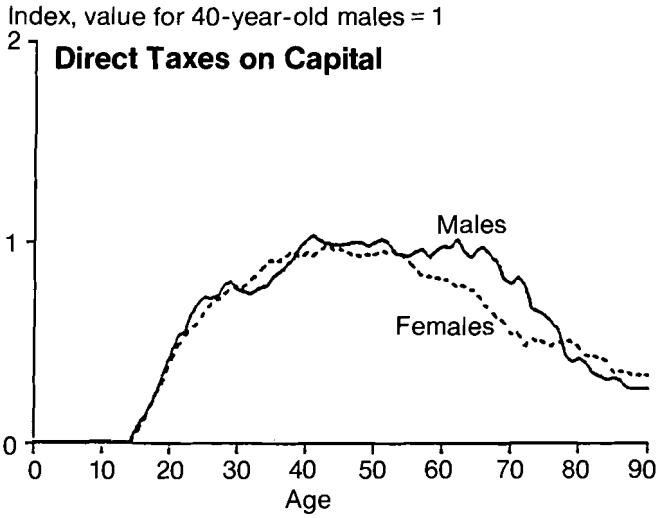

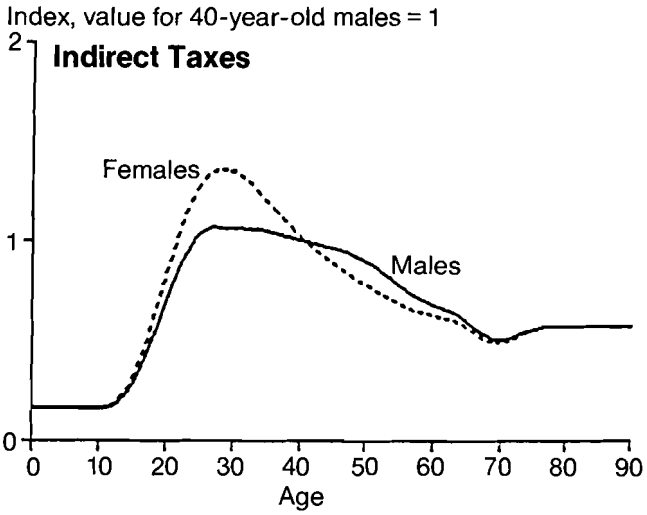

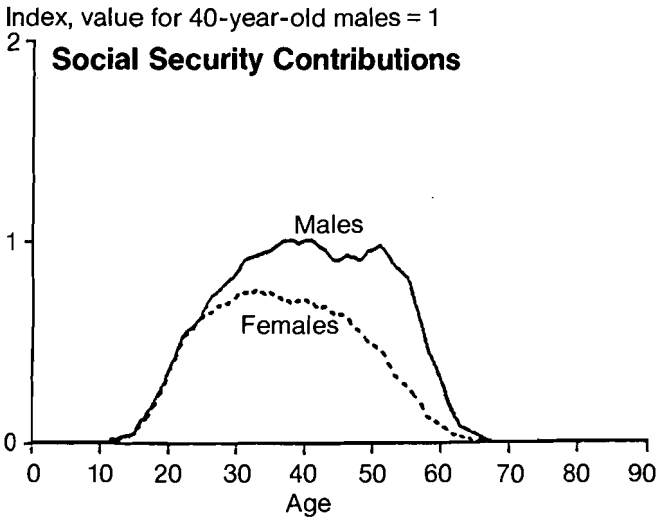

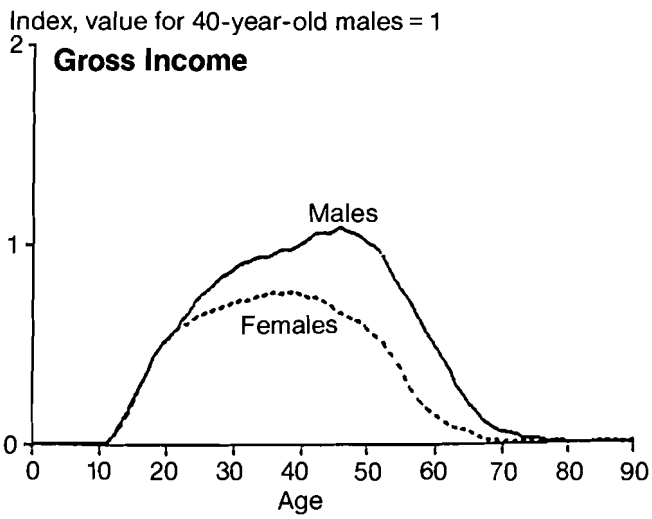

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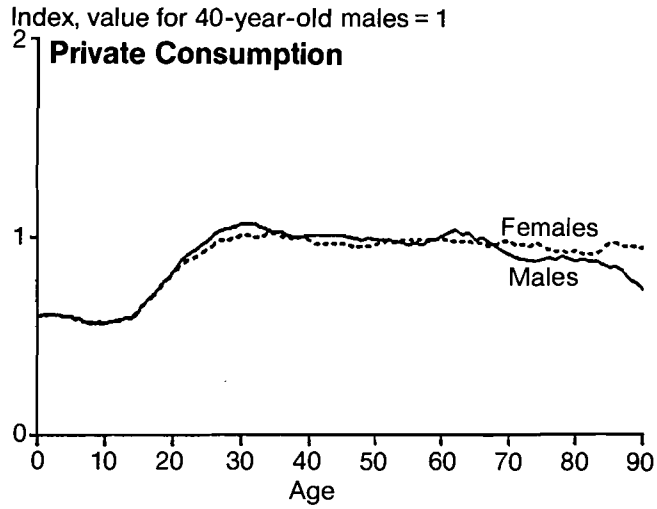

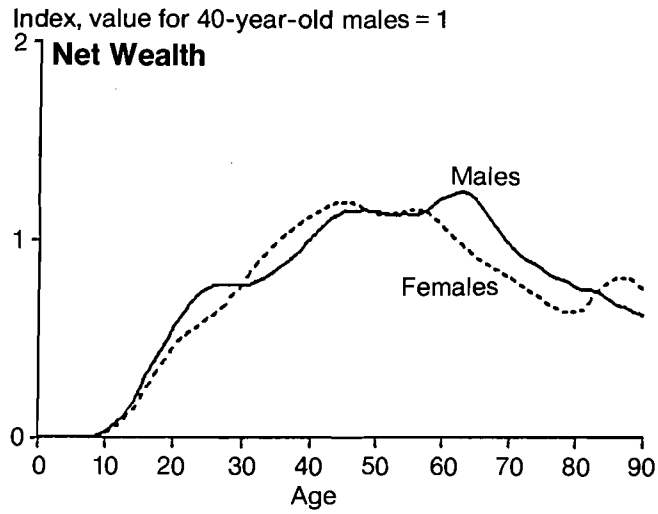

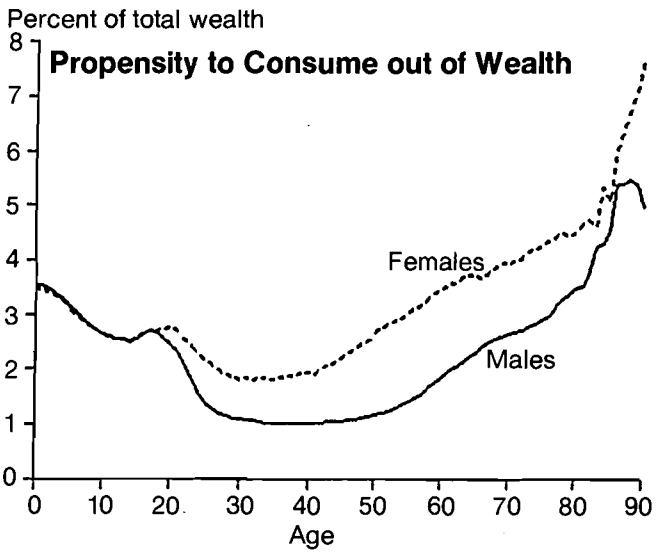

Source: Authors' calculations.