

Intergenerational Risk Sharing and the Effects of Social Security Reforms

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Abstract

With increasing pressure for social security reform in many countries, it is important to understand the extent to which families share risk across generations in an effort to offset the effects social security reforms. In particular, understanding the degree of this intergenerational risk sharing is critical for evaluating the distributional consequences of potential social security reforms that reduce benefits of future retirees. We address this topic using data from the Bank of Italy's Survey of Household Income and Wealth and variation from multiple pension reforms in Italy that reduced social security wealth of young workers while leaving benefits for existing retirees largely unchanged. The results indicate relatively little intergenerational risk sharing, though the empirical analysis is confounded by other adverse macroeconomic events and policy changes in the 1990s that may have differentially affected younger and older individuals. Further research on changes in specific intergenerational risk sharing mechanisms following social security reforms may yield valuable policy-relevant insights.

1. Introduction

Unfunded public pension schemes present special challenges for would-be reformers, perhaps the most important of which is the transition cost of moving to a new system. Reforming unsustainable systems must involve some combination of reducing the pension benefits or increasing the tax contributions of certain groups in the population. An important consideration in predicting the welfare costs of potential social security reforms is the extent to which families share the burden of such reforms across generations. For example, consider a social security reform that reduces benefits for future retirees but leaves benefits for current retirees unchanged. Even though they will receive different retirement benefits, current and future retirees are linked as families, and the different generations within the family may share the burden of the social security reform. Specifically, older current retirees may reduce their consumption and increase their transfers to younger future retirees so that the younger future retirees do not experience a significant welfare loss given the reduction in social security benefits from the reform.

Understanding the extent of intergenerational risk sharing following social security reforms can also have methodological implications for future research. Previous research (see for example Attanasio and Rohwedder 2003 or Attanasio and Brugiavini 2003) has traditionally relied on difference-in-difference research designs. In these empirical strategies, younger workers are classified as “treated” since they are directly affected by pension reforms, and older workers or current retirees are classified as “controls” since they are not directly affected by the pension reforms. However, if older individuals adjust their behavior to provide transfers to younger individuals, it may not be accurate to classify older individuals as controls since they are indirectly affected by the pension reforms.

In this research, we seek to better understand the intergenerational incidence of social security reforms by analyzing outcomes following two significant pension reforms in Italy in 1992 and 1995. These reforms significantly reduced the pension wealth of younger cohorts, both absolutely and relative to older cohorts. Thus, without compensating transfers from older cohorts to younger ones, younger cohorts would bear the large majority of the burden of the reforms. In the next section, we describe the data

used in our empirical analysis. In section 3, we discuss the institutional background in Italy and the pension reforms in 1992 and 1995. Section 4 presents the empirical analysis and section 5 concludes.

2. Data

Our analysis is based on the Bank of Italy's Survey of Household Income and Wealth (SHIW) dataset. The SHIW contains detailed information on household composition, income, and consumption. In recent years, the SHIW has collected data on a nationally representative sample of roughly 8,000 households in Italy, comprising about 24,000 individuals. For our analysis, we use data from surveys occurring during the period from 1980-2010, during which time the survey was conducted roughly every two years. Our main analyses are based on a sample size of 110,277 person-years. Bandolini and Cannari (1994) provide a more detailed discussion of the quality of the SHIW data.

The variables used in the empirical analysis come from the SHIW Historical Database. To measure income, we use net disposable income excluding income from financial assets ("y1"). This variable includes compensation of employees, pensions and other transfers, net income from self-employment and entrepreneurial income, and income from buildings. To measure consumption, we use total consumption which includes spending on durables and non-durables. Households are asked several questions about spending on particular durable goods and a catch-all question about spending on non-durables; for example, "What was your family's average monthly expenditure in 1995 for all consumption items? Consider all expenses, including food, but excluding those for: housing maintenance; mortgage installments; purchases of valuables, automobiles, home durables and furniture; housing rent; insurance premiums." There is evidence that total consumption is underestimated in the SHIW (Browning et al. 2003), so in our analysis we avoid making any inferences that depend on the level of consumption expenditures. Instead, our analysis depends only on there not being a sudden, large change in the extent of underreporting around 1992. Finally, we use a variable called "other income" as a rough proxy for inter-household transfers. This variable measures the income that individuals receive from other individuals on a regular basis, such as gifts, cash and alimony. Throughout the empirical analysis, we use the

individual-level income measures available in the SHIW. We calculate per-capita consumption by dividing the household-level consumption measures by the number of individuals in the household.

3. Background

The Italian social security system was established in the early 1970s and, like the U.S. Social Security program, is an unfunded (pay-as-you-go) system. Consistent with many other countries' experiences, the generosity of the pension system and demographic transitions led the system to become unsustainable. To help restore fiscal balance, the government implemented two significant pension reforms in the 1990s: the Amato reform in 1992 and the Dini reform in 1995. While we summarize the key elements of the pension reforms in this section, Franco (2002) provides a more complete discussion of the history of the Italian social security system, and Brugiavini (1999) and Brugiavini and Peracchi (2004) provide a more detailed discussion of the financial incentives for retirement within the Italian pension system. A primary goal of the Amato reform was to reduce pension expenditures by increasing eligibility standards and reducing benefit generosity. The primary elements of the reform were the following. First, for private sector employees, the Early Retirement Ages were increased from 55 to 60 for men and from 60 to 65 for women. Second, eligibility for old-age pensions was made more restrictive by increasing the minimum number of required contribution years from 15 years to 20 years. Third, benefit amounts were reduced since the length of the earnings history used to compute benefits was increased; for younger cohorts, the entire earnings history would be used in the computation rather than only later (and typically higher-income) years. This change reduced benefits by including relatively low-earnings years from the early parts of individuals' careers. Fourth, benefit generosity was also reduced by indexing benefit amounts to price inflation instead of wage inflation. The savings from the pension reform were significant; roughly 25% of pension liabilities were eliminated. Nonetheless, many of the changes applied only to future cohorts since the reform left many current retirees exempt from the changes and imposed long phase-in periods. Most relevant for our purposes is that the effects of the reform differed systematically by age: losses in pension wealth were greatest for younger cohorts.

A second major pension reform was implemented in 1995. Similar to concurrent pension changes in Sweden, this reform, known as the Dini reform, aimed primarily to tighten the link between perceived contributions and expected pension benefits. The primary elements of the reform, which would apply to all workers, were the following. First, each worker would hold a notional social security account in which the balance would be based on contributions made over the worker's entire career. Second, individuals would choose a retirement age between 57 and 65. Based on the age of retirement, the balance in the individual's notional account would be converted into pension benefits. In particular, the retirement age-related coefficients were set so that benefit amounts would be actuarially adjusted based on gender-specific life expectancy at the age of retirement. These coefficients would be adjusted for future cohorts given changes in life expectancy. Previous benefit computation strategies had not taken such actuarial adjustments into account. This reform did not greatly affect future pension liabilities since benefits were not significantly altered and also because the phase-in period would be very long as the major elements would only apply to those beginning work after 1995. In our analysis, we focus primarily on the 1992 reform since that reform had the largest impact on the pension wealth of different generations.

While these two major pension reforms might offer an interesting opportunity to study intergenerational risk sharing, such a research strategy is complicated by several other macroeconomic events that occurred in Italy around the same time, many of which also had the effect of reducing the income of younger individuals relative to older ones. First, in 1992 the Italian government raised tax rates on employment and self-employment income. Like the pension reforms, these tax reforms are likely to have reduced the after-tax net income of younger individuals (who have more of their working life ahead of them) relative to the income of older individuals. Also in 1992, Italian voters elected a new government just after several political scandals, and the newly elected parliament passed legislation to generally reduce public spending (see Miniaci and Weber, 1999). Second, in 1993 Italy experienced a particularly severe recession. The recession included a currency crisis that led the government to devalue the Italian Lira. While Italy has experienced other recessions in 1981 through 1983 and 2001 through 2004, the recession in 1993 was the most severe of these episodes. While the effects of

recessions generally tend to be larger for younger cohorts, the recession in the 1990s was also a period in which labor market institutions shifted in ways that may have disproportionately affected younger cohorts. Specifically, following the events of the early 1990s, labor markets in Italy became less rigid as the labor market shifted away from wage indexation for all employees toward greater pay inequality. Additionally, labor contracts became less regulated and more flexible. As a result of these changes, younger cohorts generally experienced a higher degree of inequality following the 1990s. Thus, some younger individuals who earned higher incomes may have had a greater capacity to offset their own losses in pension wealth rather than having to rely on transfers from other family members.

Figure 1 highlights aggregate changes in Italy during the early 1990s. These plots, taken from Jappelli and Pistaferri (2010), illustrate changes in aggregate income consumption and employment in Italy during the 1990s. Panel A shows that, following a period of consistent, sustained growth over the 1980s, per-capita disposable income decreased sharply during the early 1990s and then recovered in the later 1990s. Consistent with panel A, the plot in panel B shows that per-capita consumption also fell sharply during the early 1990s. While the changes in employment are less clear based on the unemployment rate illustrated in panel D, the plot in panel C shows that the employment-to-population ratio decreased sharply during the early 1990s as job loss was significant during this period. In our analysis below, we focus more explicitly on the differential changes in some of these measures across different cohorts.

4. Analysis

4.1 Empirical Strategy

In this section, we describe our regression strategy to examine how income and consumption changed following the recession and pension reforms in the early 1990s in Italy. Our strategy is based on the following regression model,

$$y_i = f(\text{age}_i) + \beta_1 \text{year}_i + \beta_2 \text{female}_i + \sum_{k=1}^{20} \gamma_k \mathbf{1}(\text{region}_i = k) + \sum_{k=1}^5 \delta_k \mathbf{1}(\text{city_pop_cat}_i = k) + \varepsilon_i.$$

In this regression specification, y_i denotes the outcome variable of interest for individual i . Our analysis will focus on the following outcome variables: disposable income, total consumption expenditures, number of household members, and other income. On the right-hand side of the equation, the independent variables are: a 5th-order age polynomial $f(\text{age}_i)$, a linear time trend denoted by year_i , and dummies for gender, region, and city size.

This regression model is used to construct counterfactual values of the outcome variables. In particular, we wish to examine how observed outcomes after 1992 diverged from what would have occurred had the recession, reforms and other macroeconomic events in the early 1990s not occurred. To achieve this aim, we take two steps when estimating the above regression specification. First, we estimate this regression equation using only observations from prior to 1992. This step is based on the assumption that the events in 1992 (i.e. the reforms, recessions and other adverse macroeconomic events) were unanticipated so that, individuals prior to 1992 could not adjust their behavior in response to the events. Based on this assumption, using only information from prior to 1992 allows us to estimate the coefficients of the regression specification without any influence from the reforms or other adverse events. Therefore, under the assumption that the time trend and other estimated correlations or relationships would have persisted in the absence of the reforms and recession, we can use the estimated coefficients and time trend to predict outcomes had the events in the early 1990s not occurred. We will compare the observed outcomes for income, consumption, household size and other income to predicted counterfactual values constructed by using this estimated regression specification for each respective outcome variable.

A second important step in estimating the above regression equation and constructing counterfactual values is determining which variables to include and exclude from the equation. We aim to include only those variables whose values are not directly affected by the events of the early 1990s. We aim to exclude any variables whose values are directly affected by the events of the early 1990s, since the regression model is designed to predict the counterfactual outcomes that would have arisen had the events of the early 1990s never occurred. To illustrate our strategy, consider an example of a potential independent variable that we ultimately exclude from the prediction model, an

indicator of whether the individual is employed or unemployed. We exclude employment status from the income-prediction model because the events of the early 1990s – and the recession of 1993 in particular – directly affected the employment status of many individuals in the economy. Were employment included in the model, predicted counterfactual income levels after the early-1990s would partially reflect the changes in employment due to the recession. But changes due to the recession should not be incorporated into a model designed to predict various outcomes in the absence of the recession. An example of a potential independent variable that we include in the prediction model is the age of the individual. Age is not directly affected by the reforms, so changes in the age mix of the population would be expected to influence average income levels in the economy whether or not the events of the early 1990s occurred. For robustness, we have also explored results when including a richer set of covariates (education, type of employment [self-employed, private sector, etc.], industry, and employment status [employed, unemployed, student, pensioner, etc.]); the results that we discuss below are robust to including these variables. The estimated regression coefficients for each of the outcome variables of interest are presented in Appendix Tables A1-A4. The “Base Controls” specification includes the covariates shown in the above regression equation, and the “Full Controls” specification includes these additional covariates. In the next section, we discuss the graphical evidence that captures the main results from the regression framework.

4.2 Graphical Evidence

This section presents graphical evidence on the combined effects of the 1992 reforms and the 1993 recession on the income and consumption of individuals of different ages. The main goal is to measure the extent of intergenerational risk sharing by analyzing how the income shocks experienced by different cohorts translated into their consumption. To this end, we consider three cohorts, defined by their age in 1992: young workers (age 25-34 in 1992), older workers (age 35-50), and retirees (age 60-75).

Figure 2 presents estimates of the income shocks experienced by different cohorts around 1992. We define income shocks as the shortfall of actual income relative to predicted income, where predicted income is based on prevailing economic trends in the

period leading up the reforms and recession. In particular, in any year t predicted income is the fitted value of income in year t from the regression model discussed above. As previously discussed, the regression is estimated on data *before* 1992. Predicted income after 1992 can therefore be interpreted as the income that would have been expected to occur had the reforms and recession not occurred. Thus, the differences, if any, between actual income and predicted income after 1992 are interpreted as the income shock due to the combined effects of the 1992 reforms and 1993 recession.

The first two panels of Figure 2 plot predicted and actual income (panel A) and the gap between the two (predicted income – actual income, panel B) as a function of calendar year. The third and fourth panels of Figure 2 plot the same as a function of the average age of each cohort, with vertical lines indicating the average age of each cohort in 1992. The graphs reveal noticeable shortfalls in income relative to predicted levels for the two working-age cohorts beginning around 1992 and persisting at least 15 years thereafter. Young workers experienced the largest shortfalls relative to predicted income. Retirees, by contrast, experienced only very modest income shortfalls relative to predicted levels. The patterns correspond to what one would expect given the nature of the pension and tax reforms (which reduced after-tax income for working-age individuals but not retirees) as well as the recession.

To get a sense of the extent to which different cohorts shared the burden of the income shocks, we examine how consumption of these cohorts changed after 1992. We follow a similar regression strategy as we did with income; in particular, we use data from prior to 1992 to estimate a regression model of per capita consumption expenditures, and we use this model to predict consumption after 1992 based on these pre-1992 trends. Figure 3 presents the results. Beginning around 1992 and persisting at least 15 years thereafter, actual consumption falls far short of its predicted levels for the two working age cohorts. The shortfalls are similar for both working-age cohorts, although the shortfalls are slightly larger for the young. For retirees, by contrast, consumption remains roughly in line with its predicted trend.

In comparing the income and consumption shortfalls of the different cohorts, two main results stand out. First, although young workers experienced by far the largest income shortfalls, young and older workers experienced similar declines in consumption.

This could potentially reflect some resource sharing between cohorts, although more work is needed to investigate this possibility. Second, retirees experienced no detectable consumption shortfall, which suggests that they did not make large transfers to their children and other younger family members who experienced large income shortfalls. It is possible that the apparent lack of response by retirees could partially reflect a measurement problem – reported consumption might in some cases include transfers to family members. Investigating this possibility is a valuable subject of future research. Although it is tempting to compare the magnitudes of the consumption and income shortfalls, this is problematic given the known problem of under-reporting of this consumption measure (Browning et al. 2002).

In the final part of the empirical analysis, we aim to learn more about the possible mechanisms behind intergenerational risk sharing. Specifically, we examine how co-residence and other sources of income (beyond wage of self-employment income) change for different cohorts following the pension reforms and macroeconomic events in Italy in the early 1990s. Intuitively, one might expect to see an increase in co-residence following the reforms and recessions in an effort to save on costs, since larger households enjoy greater economies of scale. For example, young adult children might delay the time at which they leave their parents' households. Furthermore, we might also expect to see an increase in other income for younger workers since they may be more likely to receive financial transfers from older retired parents following the pension reforms.

Figure 4 presents plots of co-residence and other income by age group. The household size figure is created using a strategy similar to the one used to create Figures 2 and 3. In particular, we use the pre-1992 data for each age group to forecast the number of household members after 1992. We do not include predicted values of other income due to the small sample size in the pre-1992 years for that variable. Based on these figures, it is difficult to see any distinct changes in either variable after 1992. There is no evidence to indicate that household size increased for younger workers or that other income increases for younger workers after 1992. Overall, while these mechanisms may have been at work, the data are too noisy to draw any clear conclusions regarding the mechanisms behind intergenerational risk sharing following the events in Italy during the early 1990s.

5. Conclusion

Overall, the evidence suggests that risk sharing across generations in Italy in the 1990s was limited. Specifically, shortfalls in different cohorts' consumption expenditures tracked fairly closely their shortfalls in income. More research is needed to establish more definitively the relationship between income shocks and consumption as well as to investigate the mechanisms by which the link between the two might be lessened, e.g., intergenerational transfers. The results so far, however, suggest that the true incidence of the burden of the Italian pension reforms matched fairly closely their statutory incidence. In light of these results, it seems unlikely that compensatory transfers within families would offset much of the distributional consequences of similar pension reforms.

6. References

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Appendix Table A1: Income Regression

	Base Controls	Full Controls
age	7,682.60 (1,317.023)**	-3,870.62 (1,353.897)**
age ²	-260.568 (54.548)**	179.227 (55.800)**
age ³	4.545 (1.087)**	-3.491 (1.107)**
age ⁴	-0.041 (0.010)**	0.031 (0.011)**
age ⁵	0 (0.000)**	0 (0.000)**
year	270.105 (9.332)**	197.66 (9.942)**
female	-10,622.00 (63.916)**	-5,527.55 (72.866)**
Region Dummies	Yes	Yes
City Size Dummies	Yes	Yes
Dummies for Education, Employment, Industry, Employment Status	No	Yes
R^2	0.24	0.37
N	109,305	89,908

Notes: * $p < 0.05$; ** $p < 0.01$

Appendix Table A2: Consumption Expenditure Regression

	Base Controls	Full Controls
age	2,774.87 (459.736)**	919.10 -494.775
age ²	-127.507 (19.047)**	-55.143 (20.396)**
age ³	2.743 (0.380)**	1.383 (0.405)**
age ⁴	-0.028 (0.004)**	-0.015 (0.004)**
age ⁵	0 (0.000)**	0 (0.000)**
year	189.081 (3.267)**	179.67 (3.641)**
female	-92.825 (22.340)**	583.32 (26.646)**
Region Dummies	Yes	Yes
City Size Dummies	Yes	Yes
Dummies for Education, Employment, Industry, Employment Status	No	Yes
R^2	0.12	0.22
N	110,277	90,373

Notes: * $p < 0.05$; ** $p < 0.01$

Appendix Table A3: Household Size Regression

	Base Controls	Full Controls
age	-4.96 (0.155)**	-4.34 (0.171)**
age^2	0.203 (0.006)**	0.178 (0.007)**
age^3	-0.004 (0.000)**	-0.003 (0.000)**
age^4	0 (0.000)**	0 (0.000)**
age^5	0 (0.000)**	0 (0.000)**
year	-0.025 (0.001)**	-0.021 (0.001)**
female	-0.128 (0.008)**	-0.23 (0.009)**
Region Dummies	Yes	Yes
City Size Dummies	Yes	Yes
Dummies for Education, Employment, Industry, Employment Status	No	Yes
R^2	0.2	0.2
N	110,277	90,373

Notes: * $p < 0.05$; ** $p < 0.01$

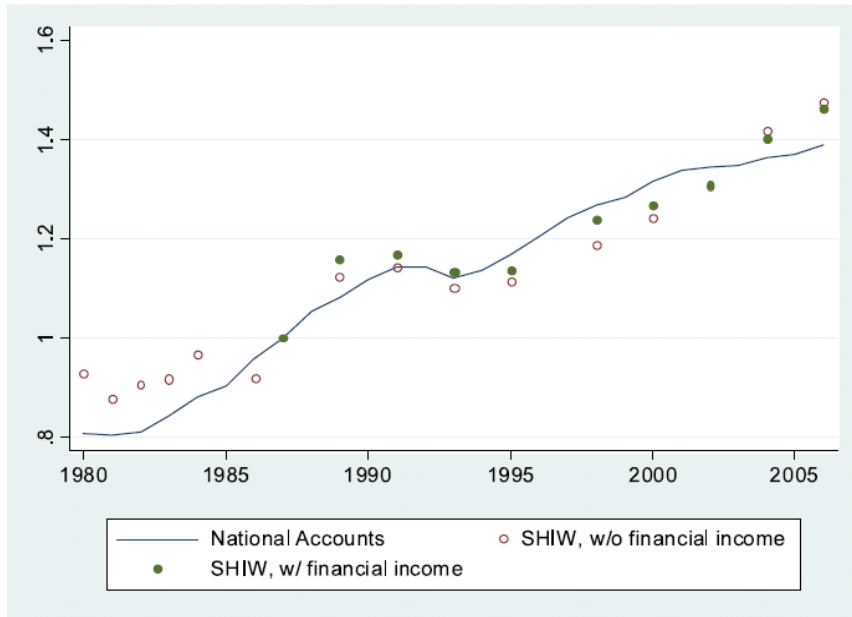
Appendix Table A4: Other Income Regression

	Base Controls	Full Controls
age	2,482.59	-256.44
	-4,147.81	-3,968.84
age ²	-95.015	34.262
	-172.726	-165.169
age ³	1.786	-1.071
	-3.474	-3.32
age ⁴	-0.017	0.013
	-0.034	-0.032
age ⁵	0	0
	0	0
year	285.671	122.018
	(51.113)**	(51.610)*
female	1,820.48	1,162.24
	(216.049)**	(224.317)**
Region Dummies	Yes	Yes
City Size Dummies	Yes	Yes
Dummies for Education, Employment, Industry, Employment Status	No	Yes
R^2	0.13	0.24
N	1,526	1,523

Notes: * $p < 0.05$; ** $p < 0.01$

Figure 1. Macroeconomic Background in Italy

A. Per-Capita Disposable Income



B. Per-Capita Consumption Expenditures

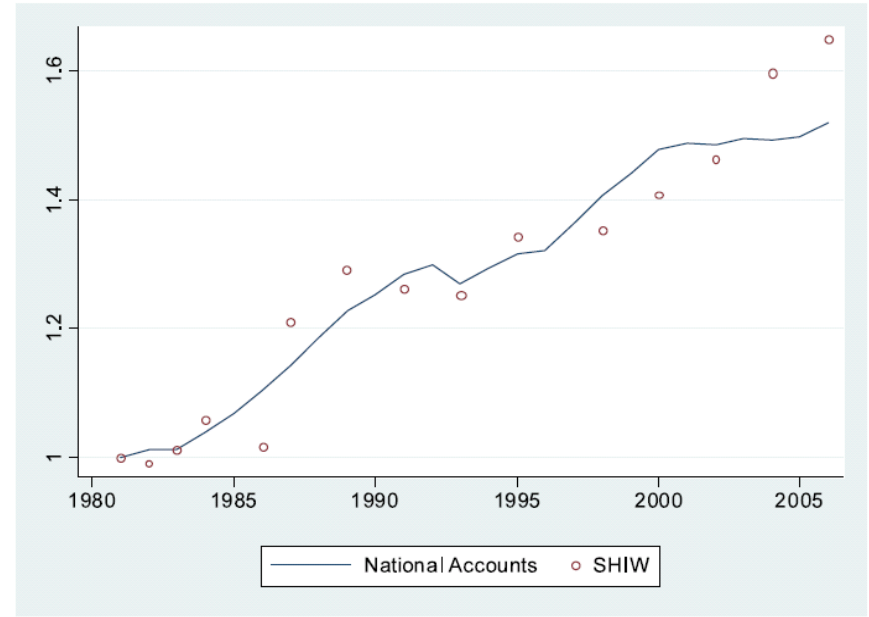
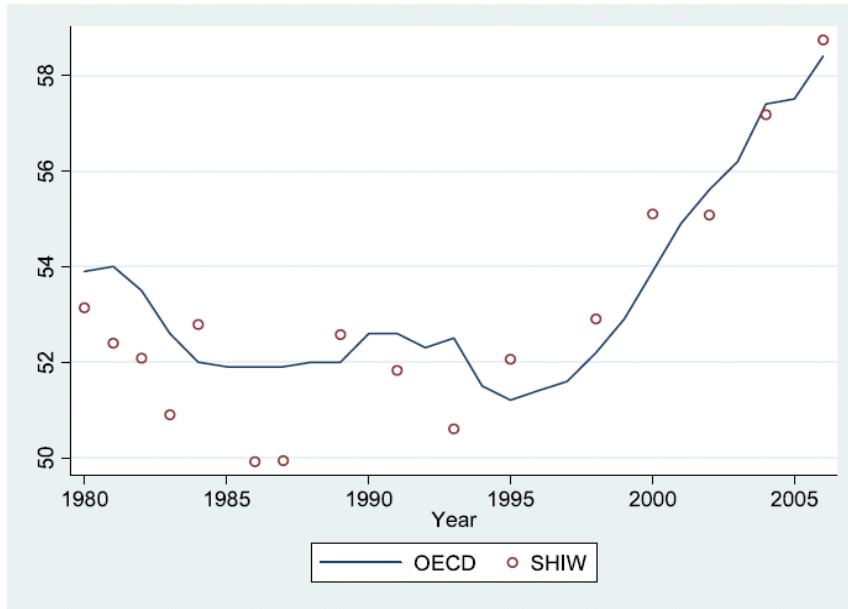


Figure 1. Macroeconomic Background in Italy

C. Employment-Population Ratio



D. Unemployment Rate

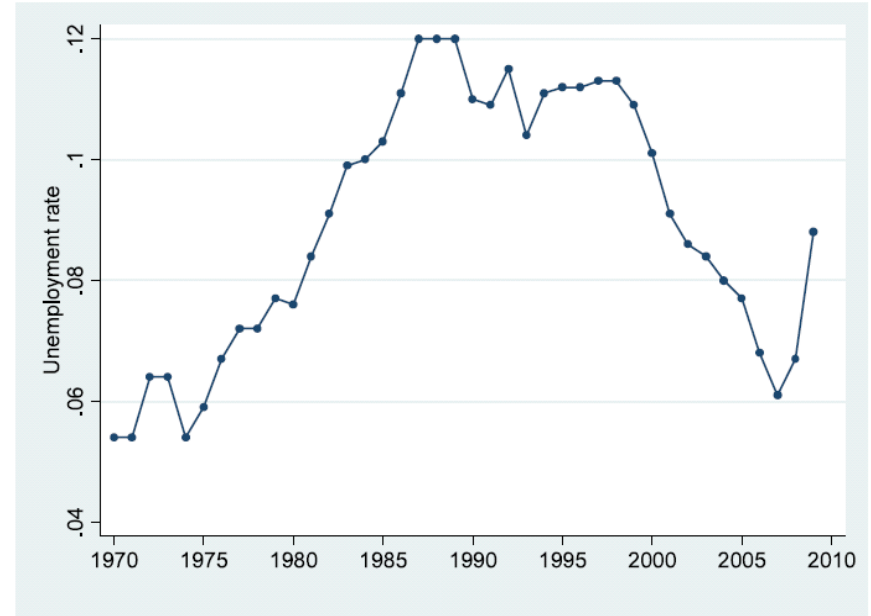
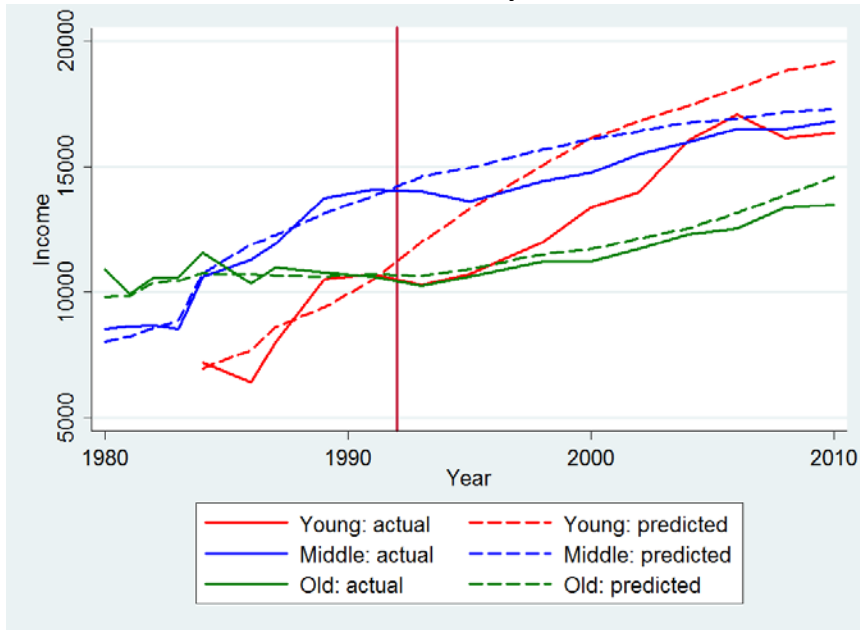


Figure 2. Income Changes: Predicted vs. Actual Income

A. Income by Year



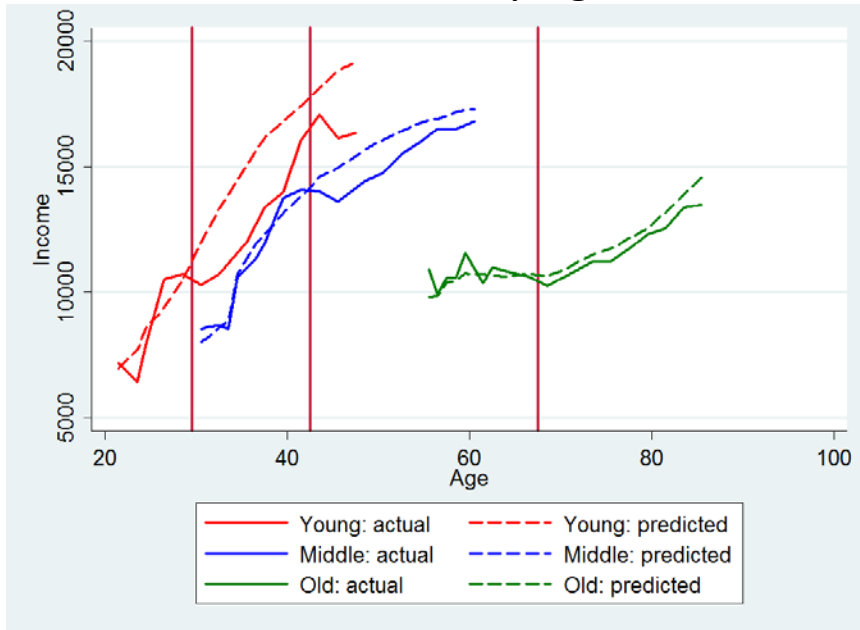
B. Predicted-Actual by Year



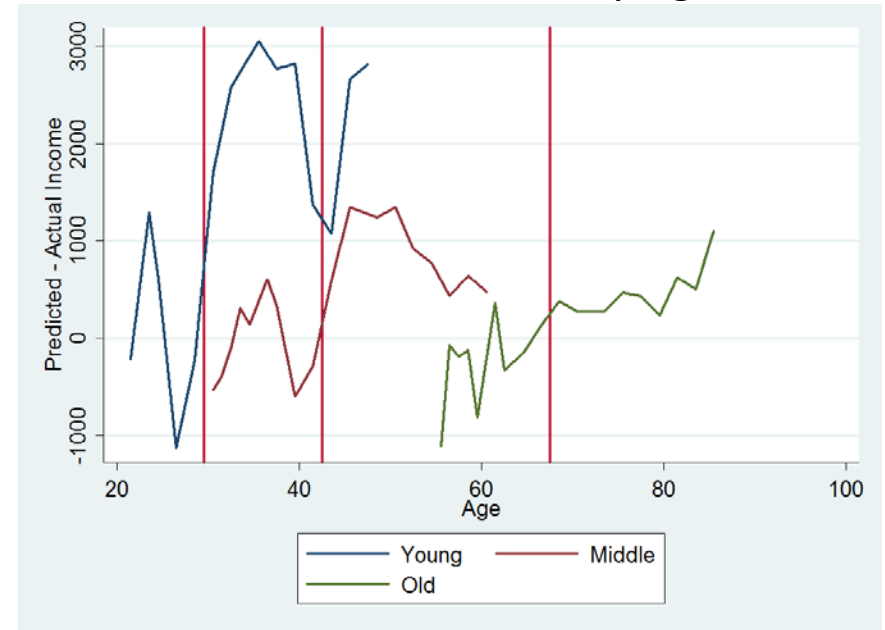
Notes: The graph on the left shows predicted vs. actual Income expenditures for each cohort. The graph on the right shows the difference between predicted and actual Income expenditures (predicted expenditures – actual expenditures). The vertical lines mark the year 1992.

Figure 2. Income Changes: Predicted vs. Actual Income

C. Income by Age



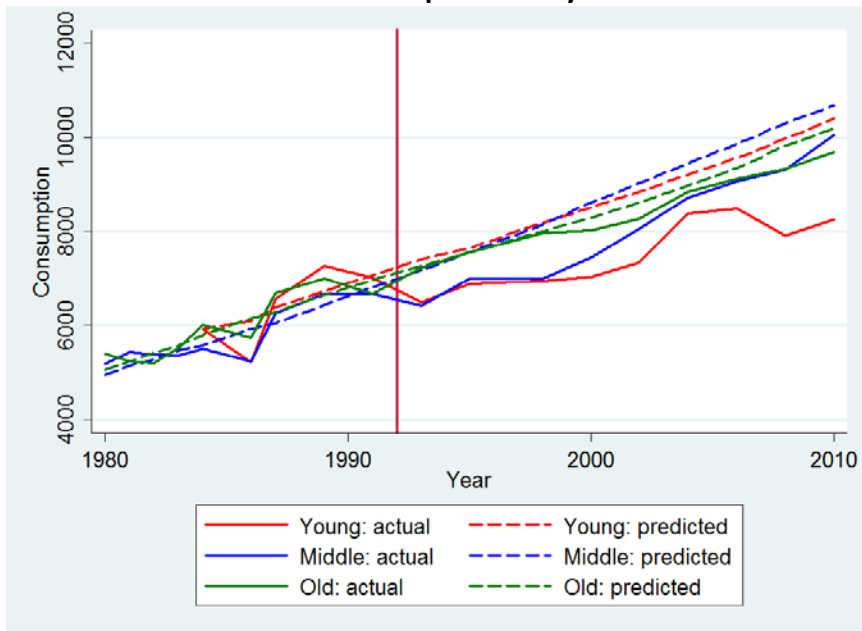
D. Predicted-Actual by Age



Notes: The graph on the left shows predicted vs. actual Income expenditures for each cohort. The graph on the right shows the difference between predicted and actual Income expenditures (predicted expenditures – actual expenditures). The vertical lines mark age in 1992.

Figure 3. Consumption Changes: Predicted vs. Actual Consumption

A. Consumption by Year



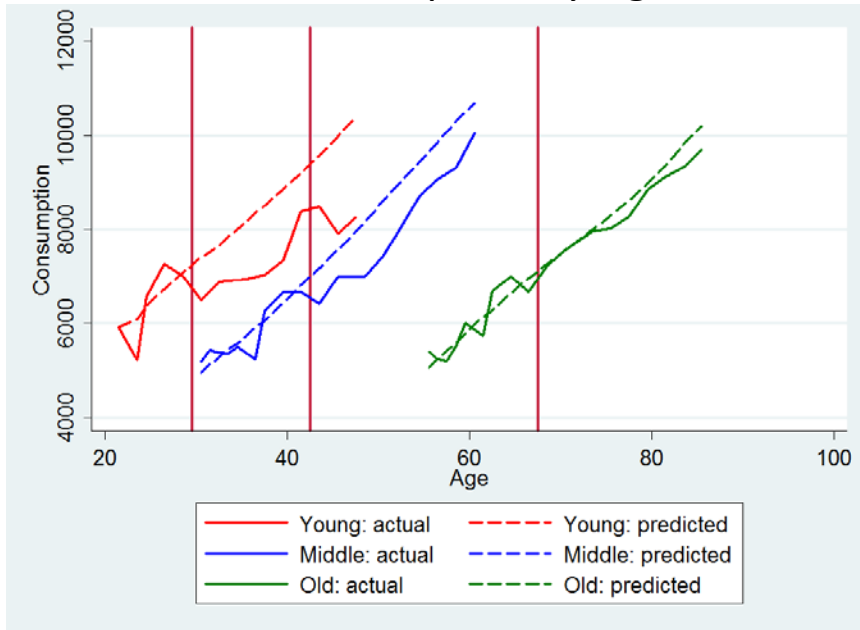
B. Predicted-Actual by Year



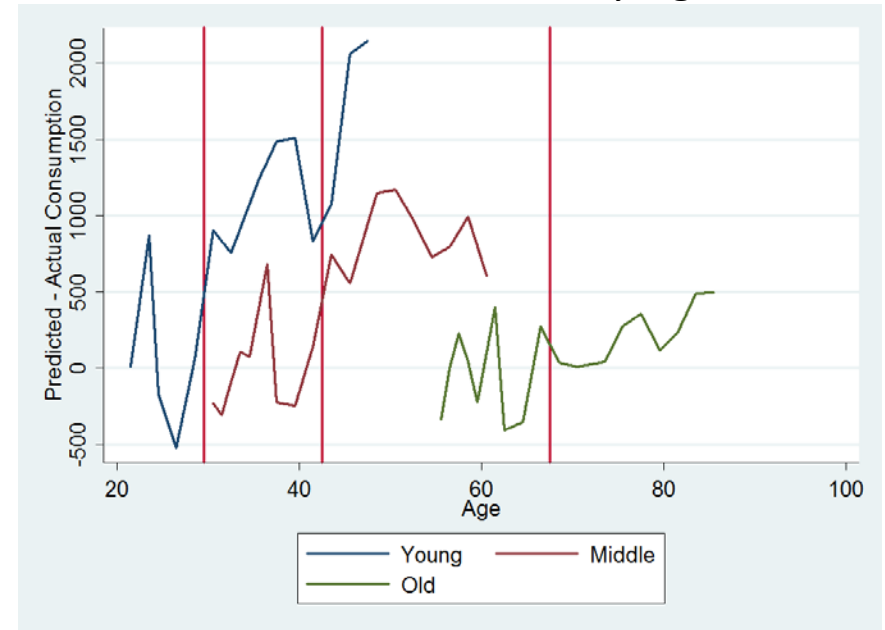
Notes: The graph on the left shows predicted vs. actual consumption expenditures for each cohort. The graph on the right shows the difference between predicted and actual consumption expenditures (predicted expenditures – actual expenditures). The vertical lines mark the year 1992.

Figure 3. Consumption Changes: Predicted vs. Actual Consumption

C. Consumption by Age



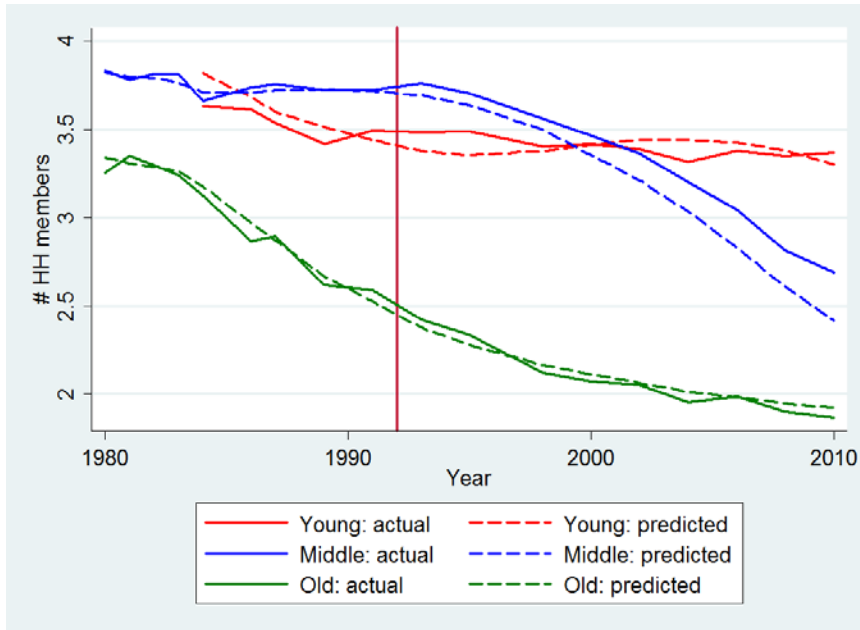
D. Predicted-Actual by Age



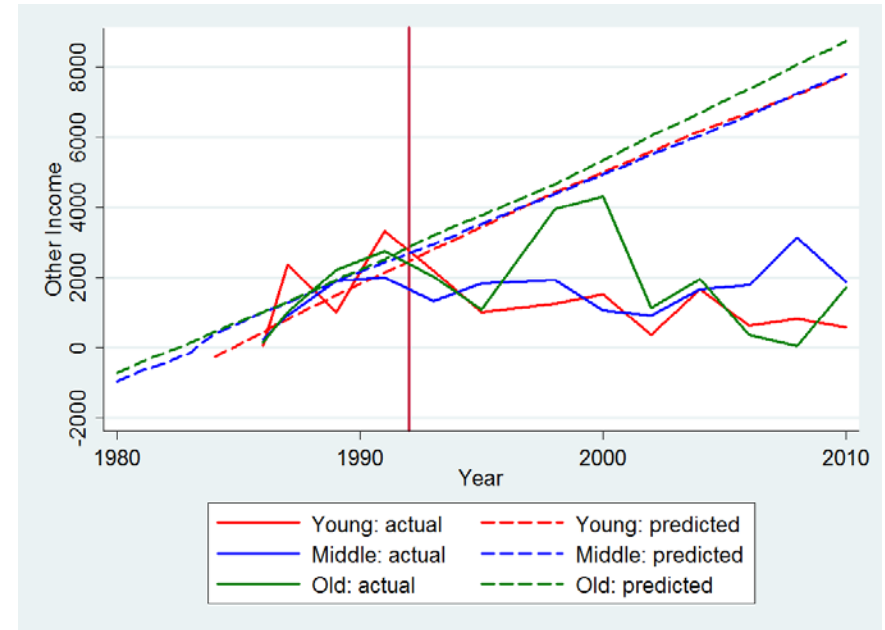
Notes: The graph on the left shows predicted vs. actual consumption expenditures for each cohort. The graph on the right shows the difference between predicted and actual consumption expenditures (predicted expenditures – actual expenditures). The vertical lines mark age in 1992.

Figure 4. Co-residence & Income Transfer Changes Predicted vs. Actual

A. Household Size



B. Other Income



Notes: The graph on the left shows predicted vs. actual household size for each cohort. The graph on the right shows predicted vs. actual other income transfers for each cohort. The vertical lines mark the year 1992.