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# REGIONAL DIFFERENCES IN GROWTH RATES: A MICRODATA APPROACH

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## ABSTRACT

*The aim of the present study is to analyze the dynamics of regional consumption and income in the context of the life cycle hypothesis, in order to explain two significant empirical evidences that have characterized Italian economy in the last two decades: (i) the persistence of a wide gap between the levels of income of the Northern and Southern areas of Italy; (ii) the fall in private saving rate. The empirical analysis consists in the estimation of cohort, age and time profiles of income, consumption and saving rate and is based on a series of repeated cross-sections of the Survey of Household Income and Wealth (SHIW) for the period 1989-2002.*

*The results obtained show that the heterogeneity in generating income flows among successive generations supports the evidence of a persistent difference of income growth, implying differences between Northern and Southern regions to determine the reduction in private savings rates. Finally, the sensitivity analysis of saving rates shows a sharp intergenerational decline for younger generations in Southern regions, reliant mainly on the lack of human capital.*

**Keywords:** Growth, Saving, Human Capital

**J.E.L.:** E21, H55

# 1 INTRODUCTION

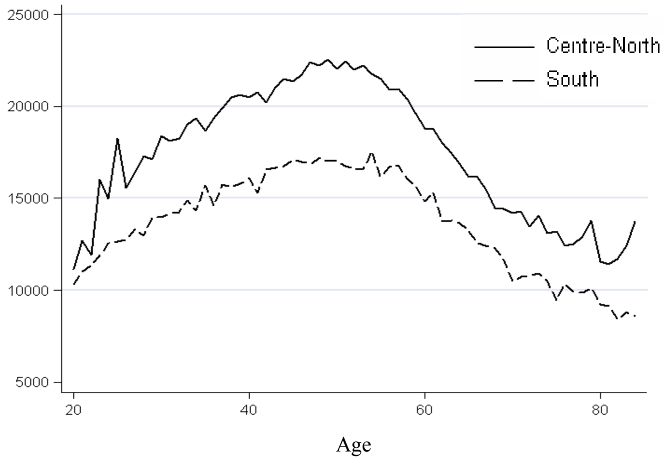
Several explanations of saving rates decrease have been proposed in the literature with the aim of interpreting individuals' behaviour in response to income and consumption fluctuations. The formulation of the life-cycle hypothesis (LCH) attempts to stylize a positive relationship between growth in income and saving. Assuming a positive trend in income across generations, the prediction of the model is that successors will have higher lifetime income profiles and there will be a redistribution of the resources toward younger generations. However, the LCH also predicts a causal relationship between changes in income (growth) and saving. In particular, at higher growth rates, the saving of the younger generations is greater than dissaving of the older generations and aggregate saving rate grows. In contrast, if the economy has zero growth, the lifetime profile of saving depends on the *within-generation* difference between income and consumption patterns.

In this paper, according with predictions of LCH, we want to investigate whether the decline of Italian saving rates depends on the slowdown in income and resulting reallocation from younger versus older generations. In particular, we assume that persistence in income differences between Northern and Southern regions is a main determinant of saving gap that, in a long-run perspective, could have caused differences in productivity and income accumulation among generations.

The previous stylized fact is focused by assessing the macroeconomic variables starting from household's behaviour. An important caution concerns the measurement of income. Indeed, the Bank of Italy's household survey, which we use in the empirical investigation, sets disposable income as a proxy for income, generating measurement biases. In this introduction section we concentrate the discussion over the empirical facts of consumption and saving rate, while in next sections we estimate household's income behaviour. Thus, by preliminarily analysing household consumption profiles by age and birth cohort, separately for North and South Italy (Figures 1.a e 1.b), it is possible to show that the hump profile are roughly similar for the Northern and Southern regions[1]. More in depth, assuming same preferences among regions, in the North the age profile of consumption remains constantly higher than that of Southern ones and it is tipped towards the young generations, justifying the presence of proportionality between consumption and lifetime resources (Carroll, Summers, 1991).

[1] The existence of *humped* profiles of both income and consumption has not been rejected in empirical tests (Deaton, 1992, 1997).

*a) Total household consumption: means by age (Centre-North and South)*




*b) Total household consumption: means by cohort and year (Centre-North and South)*

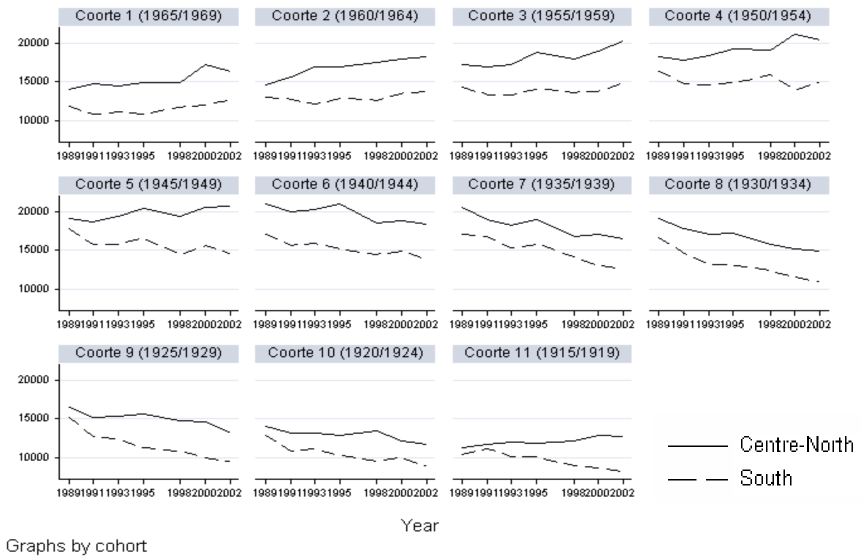
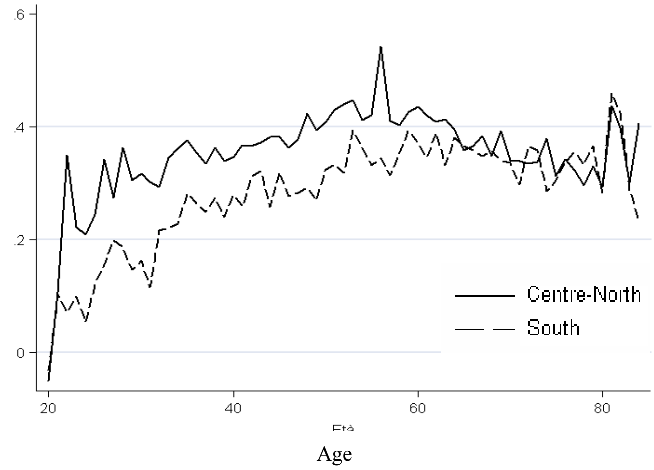



*Figure 1* Regional differences in household consumption levels

Figures 2.a and 2.b show household saving rate patterns. The previous empirical evidences are confirmed: the age profile shows that the average value of saving rate is considerably lower for the youngest households in the South and differences with the Northern regions fade out only around retirement age. A similar information can be obtained from Figure 2.b; for holder households, starting from cohort 8, the difference in saving rates between North and South are not marked, while the gap is particularly evident for the youngest generations. It is likely that the higher difference in productivity of the youngest generations is the cause of the higher North-South gaps.

Supported by these empirical evidences, in Section 2 our econometric study focuses on the dynamics of income and consumption by analysing the cohort and age profiles of the two *a) Household saving rate: means by age (Centre-North and South)*




*b) Household saving rate: means by cohort and year (Centre-North and South)*

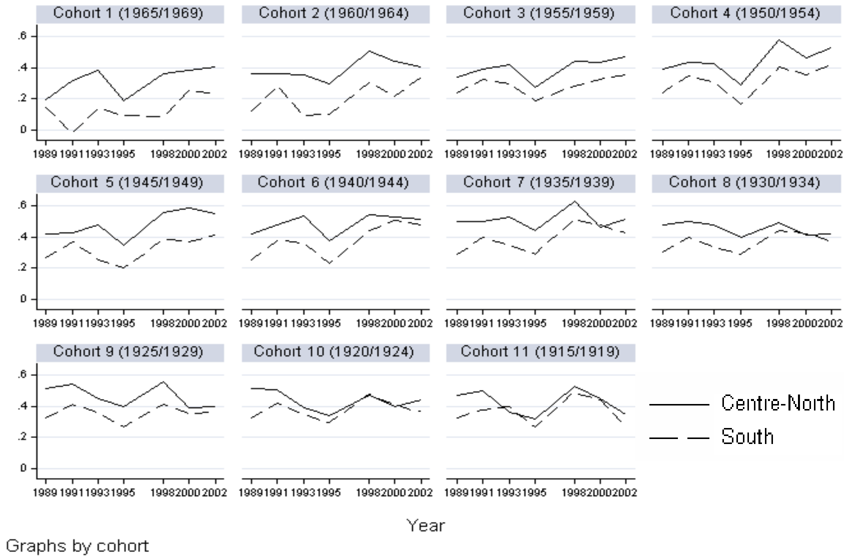



*Figure 2* Regional differences in household saving rates

variables, both in the aggregate and for four macro-regions (namely, North West, North East, Centre and South). Section 3 illustrates the specification adopted for the decomposition of cohort, age and time effects and carried out in order to evaluate the presence of generational effects and to test for the existence of income and consumption regional patterns connected with the lifecycle as for as differences in saving rates across regions (Deaton, Paxson, 1994; Attanasio, 1998). Section 4 presents empirical results. In particular, the analysis clearly shows that household composition, working status and education level significantly affect income fluctuations in Southern Italy. In particular, the sensitivity analysis shows how important are the composition effects in education in determining different income and saving rate profiles. Section 5 concludes the paper discussing some policy implications.

## 2 DESCRIPTIVE ANALYSIS

In this Section, we illustrate the dataset used in the empirical analysis by describing the cohort classification adopted and analysing the lifetime profiles of household income and consumption to account fluctuations both in the aggregate and for macro-areas.

### *1.1 Data and cohort definition*

The dataset used in this study consists in series of seven repeated cross-sections of the Bank of Italy's Survey of Household Income and Wealth (SHIW) for the period 1989-2002[2] and covers a total of 55845 households. This survey represents, together with ISTAT Household Expenditure Survey, the most complete data source available in Italy for the analysis of households income, wealth and consumption behaviours. The survey structure, exhaustively described in Brandolini (1999), has been significantly modified through years, preventing us to extend the dataset; as an example, even if data have been collected since 1965, only after 1984 is correctly reported the individual ages, which is a fundamental information for the aims of the cohort analysis. Moreover, we focus our analysis on the period 1989-2002, because for this period only we have information on total household disposable income, including income flows deriving from financial assets.

Since Bank of Italy's survey has not a panel structure, we cannot track individual households. However, by means of a cohort representation it is possible to track groups of households that share common characteristics. A cohort can be defined as a group with fixed membership formed by individuals which can be identified as they show up in the surveys (Deaton, 1985). Groups can be defined in different ways, as long as the membership remains constant through time. The most natural representation is to consider an age cohort formed by individuals (household's heads) born in the same period. For this reason, we group the households on the basis of the head's year of birth, using five-years age bands cohorts. We decide to exclude from the sample all households whose head was born after 1969 and before 1915; moreover, we limit the attention to those household with head aged between 20 and 84 only. The sample size, after dropping these observations, reduces to 52047 households. All the remaining households are allocated to 11 five-years cohorts, with first representing households with head born between 1965 and 1969 (aged 20-24 in 1989 and 33-37 in 2002), up to the eleventh

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[2] Starting form 1989, this survey is carried out every two years. The years of observation for the period 1989-2002 are: 1989, 1991, 1993, 1995, 1998, 2000 e 2002.

cohort which includes those households with head born between 1915 and 1919 (aged 70-74 in 1989 and 83-87 in 2002).[3].

The definition of five-years cohorts, together with birth years, observed ages, size of each cell and descriptive statistics of households income and consumption, are reported in Table 1. As it can be noted, the size of all cohorts is sufficiently large; only the dimension of the first cohort is relatively small, thus limiting the representativeness of the youngest cohort.

*Table 1* Cohort definition, cell size and descriptive statistics

| Cohort | Year of Birth | Age in 1989 | Age in 2002 | Average Cell Size | Total Cell Size | Income | | Consumption | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Median | Mean | Median | Mean |
| 1 | 1965/1969 | 20-24 | 33-37 | 330 | 2313 | 17604 | 20644 | 13322 | 14349 |
| 2 | 1960/1964 | 25-29 | 38-42 | 605 | 4236 | 19884 | 22735 | 14254 | 15659 |
| 3 | 1955/1959 | 30-34 | 43-47 | 734 | 5141 | 21352 | 24147 | 15149 | 16579 |
| 4 | 1950/1954 | 35-39 | 48-52 | 796 | 5570 | 23394 | 26422 | 16132 | 17718 |
| 5 | 1945/1949 | 40-44 | 53-57 | 902 | 6315 | 24095 | 27567 | 16449 | 18287 |
| 6 | 1940/1944 | 45-49 | 58-62 | 820 | 5742 | 23808 | 28167 | 16226 | 18225 |
| 7 | 1935/1939 | 50-54 | 63-67 | 846 | 5919 | 22139 | 26827 | 15045 | 17169 |
| 8 | 1930/1934 | 55-59 | 68-72 | 788 | 5514 | 19049 | 23629 | 13634 | 15565 |
| 9 | 1925/1929 | 60-64 | 73-77 | 737 | 5160 | 16575 | 20608 | 11935 | 13868 |
| 10 | 1920/1924 | 65-69 | 78-82 | 617 | 4321 | 13738 | 17979 | 10321 | 12198 |
| 11 | 1915/1919 | 70-74 | 83-87 | 259 | 1816 | 12924 | 16323 | 9916 | 11213 |
| Total | 1915/1969 | 20-74 | 33-87 | 676 | 52047 | 19884 | 23186 | 14254 | 15530 |

### *1.2 Descriptive analysis*

In this section we carry out a pre-estimation data analysis by examining Italian household cohort and age profiles of income and consumption.

In Figure 1 we plot the average level of income and consumption by cohort and age for the whole sample. The values of income and consumption are both expressed at 1995 constant prices by using the regional prices indexes published by ISTAT, given regional differences in price levels.

This representation allows some preliminary consideration about the existence of age and cohort effects (Kapteyn et al., 2005). Disregarding time effect, vertical differences between lines measure cohort effects; differences between consumption levels for those households observed at the same age[4], but different year of birth, can be explained by the presence of significant generational effects. The difference along the same line measures the age effect; since we have defined five-years cohorts, it is possible to track household behaviours with

[3] Since the analysis is focused only on those families with head aged between 20 and 84, the first cohort is observed between ages 20 and 37, while the last between 65 and 84 years of age.

[4] For convenience, when we refer to the age of a household we mean the age of the household's head.

different ages within each cohort in order to evaluate population aging effects. However, it is important to underline that, at this stage, it is not possible to separate cohort effects from age and time effects; in Section 3 we present the econometric model through which we can correctly decompose cohort, age and time effects.

a) Income b) Consumption

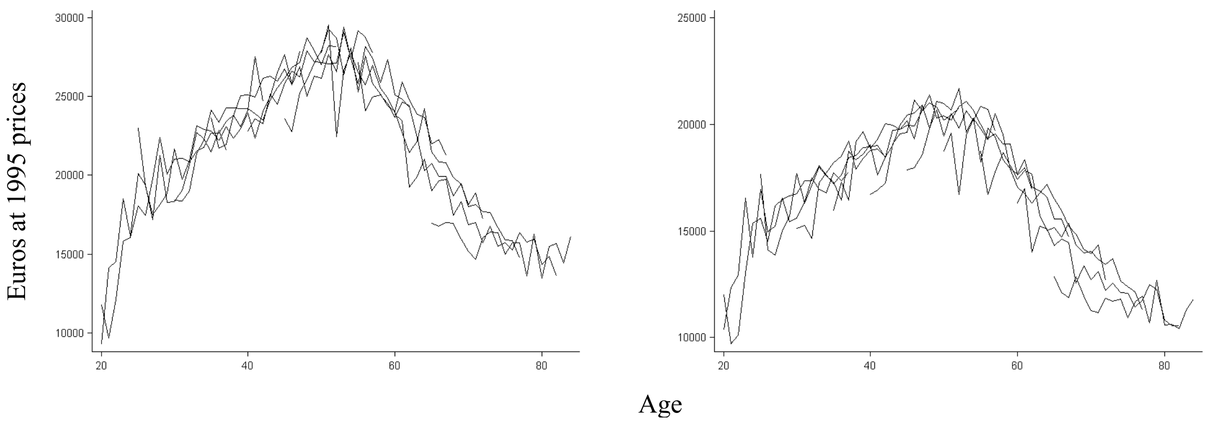



*Figure 3* Income and consumption: means by cohort and age

Analysis of Figure 3 reveals that both income and consumption profiles are hump-shaped and considerably decline in the last part of the lifecycle. In particular, average income (Figure 3.a) constantly rises up to the sixth cohort (households born in the period 1945-1949) and peaks around age 52. The following decline is sudden, particularly from the ninth cohort, with average income that, in the last cohort, returns to the levels of the youngest generations. Moreover, average income appears to be lower among adjacent cohorts at the same age, suggesting the presence of negative cohort effects for almost all the cohorts, especially for the older. The age effect is also significant, with the young and middle-age cohorts displaying a notable growth in average income as their age increases. The cohort-age profile of consumption (Figure 3.b) is similar to that of income, revealing the same hump-shaped pattern which peaks around age 53, earlier than income, and then decreases starting from age 60. This empirical evidence is in line with the stylized facts found in other countries (Banks, Blundell and Tanner, 1998; Bernheim, Skinner and Weinberg, 2001) and reveals an abrupt fall in consumption at retirement, that cannot be fully explained in terms of life-cycle optimizing behaviour (retirement consumption puzzle). From inspection of Figure 3.b it is possible to highlight the presence of a negative cohort effect starting form the sixth cohort and a flattening of oldest cohorts profile, which is likely to be connected with family composition effects (Miniaci et al., 2003).

In order to verify whether cohort profiles are influenced by household's size and composition, we consider a correction widely adopted in the literature (Attanasio, 2000) which consists in expressing income and consumption in per-equivalent adult. In our analysis, we deflate household economic variables by the modified OECD equivalence scale, which gives a weight equal to one to the first adult in the household, 0.5 to each other adult and 0.3 to each children under fourteen years. In Figure 4 we present income and consumption profiles per-equivalent adult (per capita, for short). As it can be noted from Figure 4.b, per capita household consumption expenditure continuously decreases along the lifecycle. It is possible to highlight negative cohort effects which are much more marked than those of total consumption; on the contrary, consumption levels in the oldest cohorts are increasing, suggesting existence of positive effects in the last part of the lifecycle. Moreover, we note presence of spikes in per capita consumption around retirement age, which can be correlated with higher levels of disposable income observed at the same lifecycle stage (Figure 4.a) due to the severance pay received just after retirement.
The level of per-equivalent adult income, contrary to consumption, is characterized by a stable pattern that gradually declines starting form age 60, with less pronounced cohort and age effects.

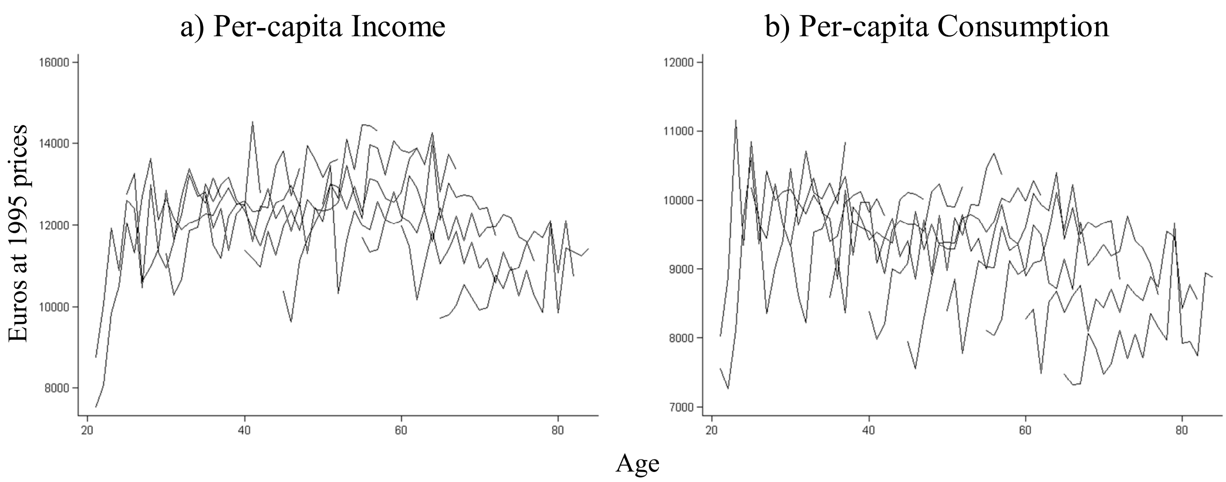



*Figure 4* Per-capita income and consumption: means by cohort and age

In order to characterize the time pattern of income and consumption, in Figure 5 we present the profiles of the two variables. Each panel in the Figure represents consumption behaviour of a single cohort from 1989 to 2002; this data representation allows to analyze, for each cohort separately, variables pattern along the business cycle.

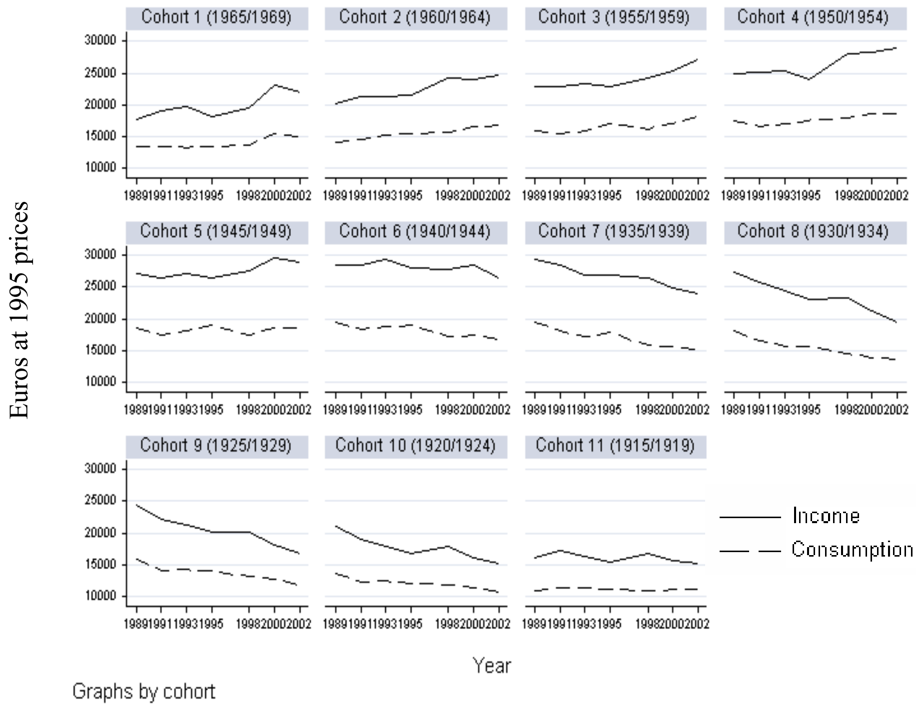



*Figure 5* Income and consumption: means by cohort and year

Comparison of different panels reveals that levels of average income and consumption increase with age up to the sixth cohort (households born in 1940-1944) and then starts decreasing, in line with the profile depicted in Figure 3. It is possible to note that the two variables display parallel patterns, with the widest vertical distances in correspondence to the fifth, sixth and seventh cohorts suggesting that the middle-age cohorts are characterized by the highest saving rates. Analysing within-cohort consumption patterns, we note that the first six cohorts are characterized by increasing levels of income and consumption, suggesting a positive time effect for the youngest cohorts; on the contrary, starting from the seventh cohort, a marked decrease in income and consumption can be noted. Thus, there is a fall in income and consumption levels of oldest cohorts, observed at ages close or subsequent to retirement.

In order to inquiry on the presence of regional disparities in household income and consumption levels, in the next Figures 6 and 7 we present the cohort and age profile of the two variables for four macro-regions (namely, North West, North East, Centre and e South).

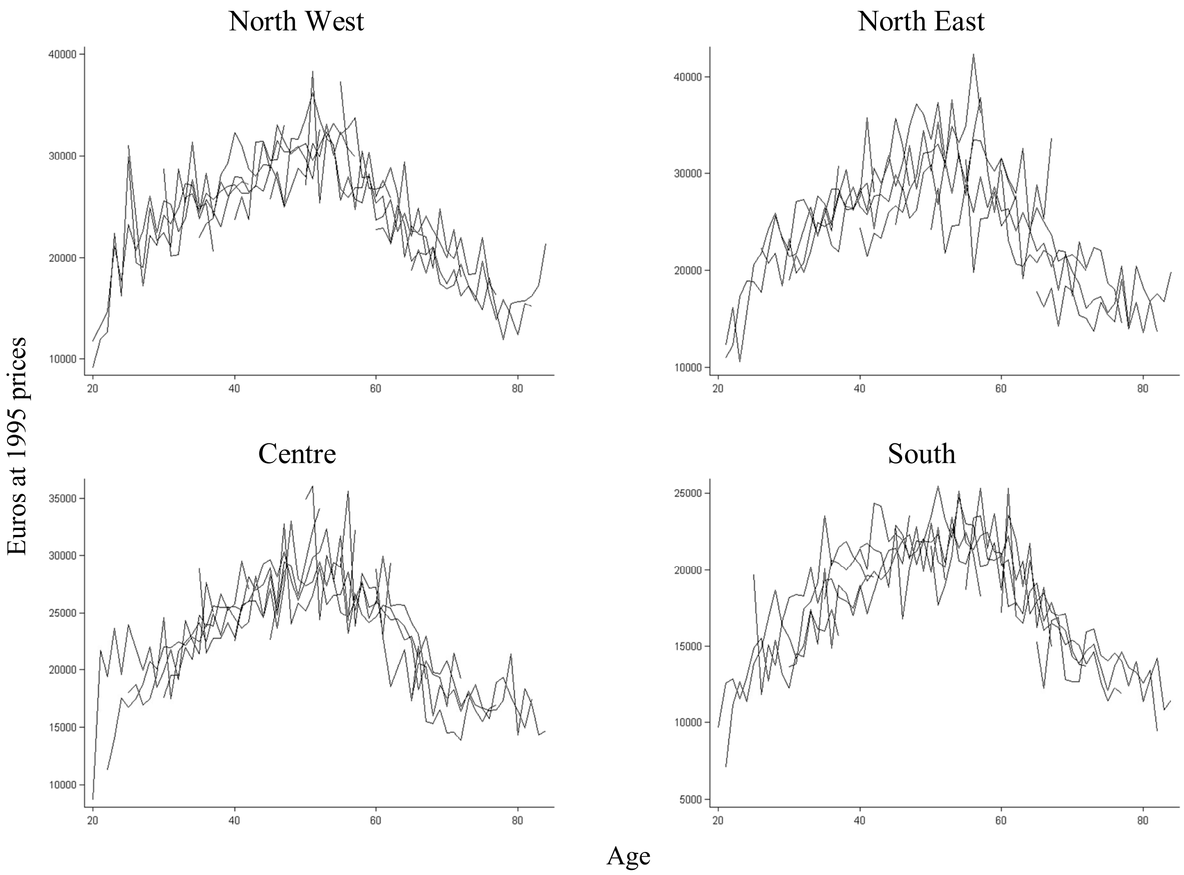



*Figure 6* Cohort-age profiles of income by region of residence

Disposable income lifecycle patterns for the four macro-regions are represented in Figure 6; graphs show that average income in the Northern regions of Italy is constantly higher than in the Southern area, with remarkable differences in the central part of the lifecycle (between 35-50 years). Age profile are similar in all regions, characterized by the typical hump-shaped pattern already highlighted even if with some peculiarity. In particular, the North East area presents the highest levels of income in the middle-age cohorts; disposable income, after peaking around age 58, slightly decreases, remaining above 20 thousand Euros a year up to the ninth cohort. Moreover, the presence of negative generational effects, from the fifth cohort onward, is much more evident than in the other areas. In the South, we highlight a certain stability in the level of income between the third and the seventh cohort, which suggests the absence of significant age effects. Finally, contrary to the other areas, a positive cohort effect can be noted for both the youngest and the oldest cohorts.

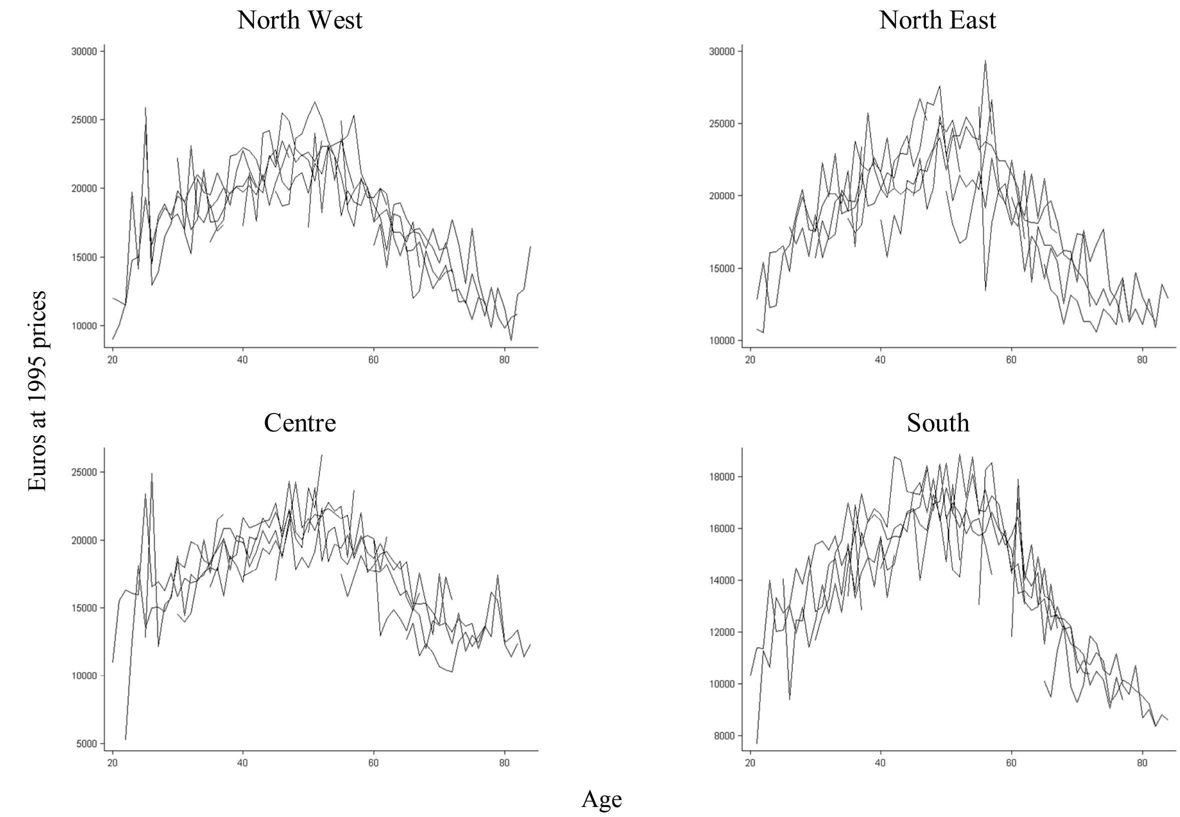



*Figure 7* Cohort-age profiles of consumption by region of residence

Figure 7 shows the cohort and age profiles of household consumption in the four areas. The *hump-shaped* previously underlined in Figure 3.b is confirmed, with important differences along the lifecycle between the macro-regions. In particular, in the South and in the Centre areas we observe the lowest consumption levels; in the South, household expenditures markedly decrease from retirement age, reaching values under 10 thousand Euros a year in the last part of the lifecycle. This pattern, together with the less pronounced decrease in disposable income, indicates that in the Southern regions the differences between income and consumption levels tends to widen along the lifecycle. As already highlighted , in the North East it is possible to note the presence of significant negative cohort effects, revealing that average consumption rises among successive generations.

## 3 DECOMPOSITION OF COHORT, AGE AND TIME EFFECTS: METHODOLOGY AND ECONOMETRIC SPECIFICATION

According to the lifecycle model, individuals optimally smooth their consumption over their lifetimes, programming consumption and saving behaviours in a long-term perspective. For this reason, consumption (and saving) decisions should differ for individuals observed at different stages of their lives and may also evolve both across generations (cohorts) and over time in response to economic fluctuations. However, as already mentioned in the descriptive analysis, without the aid of an identifying structure it is impossible to distinguish the separate effects of cohort, age and time.

In this section, we illustrate the approach adopted to identify and estimate the cohort, age and time effects, based on the methodology proposed by Deaton (1997), Attanasio (1998) and Deaton e Paxson (2000).

In the standard lifecycle model without uncertainty, consumption is proportional to lifetime wealth, with a factor of proportionality that depends on age and on the (constant) real interest rate. Disregarding the effect of interest rate, for an individual *i*, born in year *b* and observed at age *a*, consumption level can be written as:

$$c_{ia} = f_i(a)W_i \qquad (1)$$

where *c* is consumption, *W* is lifetime wealth and age *a* is equal to the difference between the year of observation (survey year) and the year of birth of the individual ( $a = t - b$ ).

Taking logarithms of equation (1), we obtain:

$$\ln c_{ab} = \ln f(a) + \ln W_b \qquad (2)$$

which allows to express consumption as the sum of two components, one of which depends only on age and the other depends only on birth-year cohort. Equation (2) can be estimated by regressing the logarithm of consumption on a set of age, cohort and year dummies:

$$\ln c = D^b \gamma_c + D^a \alpha_c + D^{a+b} \varphi_c + u_c \qquad (3)$$

where $D^b$ is a matrix of birth cohort dummies, $D^a$ is a matrix of age dummies and $D^{a+b}$ (with $a + b = 1,...,T$ , where 1 and *T* are the first and last available cross-sections, respectively) is a matrix of time (i.e. survey year) dummies. The coefficients $\alpha_c$ , $\gamma_c$ and $\varphi_c$ represent age, cohort and year effects, respectively.

By estimating equation (3), we are able to decompose cohort, age and time effects. The first effect represents the trend that is associated with generational effect, the second s gives the typical age profile associated with lifecycle changes and the third accounts for the aggregate effects that may temporarily move households off their trend and age profiles (Deaton, 1997). This decomposition is obtained under the assumption of no interactions between age, cohort and year effects, so that estimated coefficients should be considered as representing the net effect of these variables.

However, in model specification it should be noticed that there is a linear relationship among dummy variables matrices. In fact, the year in which each household is observed is equal to the age of the household head plus his year of birth ($t = a + b$). For this reason, it is not possible to identify separate effects of $a$, $b$ and $a + b$ in equation (3). In order to overcome this problem, following Deaton and Paxson (1994), we assume that any change in consumption expenditures can be attributed to age and cohort effect and that time effect captures cyclical fluctuations that average to zero over the long run. This is equivalent to assuming that any trends in the data can be interpreted as a combination of age and cohort effects and are therefore predictable; the time effect will then reflect the influence of macroeconomic shocks or the residual effect of non-systematic measurement error (Jappelli, 1999). This assumption forces us to drop one column from both age and cohort matrices of dummy variable, and the first and second year dummy variables. Moreover, the remaining year dummy variables are normalised as follows:

$$D^{a+b} = d_t - (t-1)d_2 + (t-2)d_1 \tag{4}$$

where $d_t$ is the usual zero or one dummy variable. This transformation implies that all year dummy variables sum to zero and makes year effects orthogonal to a time trend:

$$\begin{aligned} &\sum\nolimits_{a+b=1}^{T} D^{a+b} = 0 \\ &\sum\nolimits_{a+b=1}^{T} (a+b)D^{a+b} = 0 \end{aligned} \tag{5}$$

The coefficients of the first two years dummies, namely $D^1$ and $D^2$, can be then recovered from above restrictions.

As data used are at household level, it is necessary to correct for family structure effects on consumption requirement (Deaton, 1997). It is possible (Attanasio, 2001) to express household consumption in per-capita terms, dividing total consumption by the number of equivalent adults; however, taking per-equivalent adult consumption levels may be too strong a correction for family size effects, resulting only in flattening consumption profiles. For this reason, we consider a different correction, obtained by including in equation (3) the number of equivalent adults (in logarithmic terms):

$$\ln c = D^b \gamma_c + D^a \alpha_c + D^{a+b} \varphi_c + \beta_c \ln(eq\_adults) + u_c \tag{6}$$

where the $\beta_c$ coefficients allows to control for the effect of household size.

We further extend equation (6) by including demographic and socio-economic variables which are hypothesized to affect household consumption patterns. In particular, the model estimated in the empirical application includes, in addition to the cohort-age-time decomposition, a set of variables accounting for the effects of household structure, education level and working status of the household's head, respectively. These effects can be thought of as an argument of the preference function $f$ in equation (1). Formally, the extended specification of equation (6) can be written as:

$$\begin{aligned} \ln c = D^b \gamma_c + D^a \alpha_c + D^{a+b} \varphi_c + \beta_c \ln(eq\_adults) + \\ + \delta_{i1,c}(demographics) + \delta_{i2,c}(education) + \delta_{i3,c}(working\ status) + u_c \end{aligned} \quad (7)$$

where $\delta_{ij,c}$ are *demographics*, *education* and *working status* parameters of the three sets of explanatory variables, respectively. The complete set of conditioning variables considered in the empirical analysis is described in Table 2.

Following Deaton (1997) and Deaton and Paxson (2000), it is possible to analyze income in the same way as consumption in equation (3), even if there is no general framework that supports such a construction; the underlying relationship is that income at any age can be considered as proportional to lifetime resources, with a factor of proportionality that depends on age (Deaton and Paxson, 2000). Hence, we are able to estimate a counterpart to equation (7) for the logarithm of income.

$$\begin{aligned} \ln y = D^b \gamma_y + D^a \alpha_y + D^{a+b} \varphi_y + \beta_y \ln(eq\_adults) + \\ + \delta_{i1,y}(demographics) + \delta_{i2,y}(education) + \delta_{i3,y}(working\ status) + u_y \end{aligned} \quad (8)$$

The difference between logarithm of income and logarithm of consumption is a monotone increasing function of both saving-to-income and saving-to consumption ratios[5]; in particular the following inequality applies:

$$s/y \le \ln y - \ln c \le s/c \quad (9)$$

Moreover, when saving ratio is low, the difference between logarithm of income and logarithm of consumption is approximately equal to saving ratio, so the cohort-age-time decomposition of consumption and income (in logarithmic terms) automatically yields the decomposition of cohort, age and time effects of saving ratio (Deaton, 1997; Deaton and Paxson, 2000). Formally, subtracting equation (7) from (8) and omitting, for simplicity, the socio-economic variables we obtain:

[5] As saving rate rises, the difference between the logarithm of income and the logarithm of consumption gives a closer approximation to savings-to-income rate than to savings-to-consumption ratio

$$s/y = \ln y - \ln c = D^b(\gamma_y - \gamma_c) + D^a(\alpha_y - \alpha_c) + D^{a+b}(\varphi_y - \varphi_c) + (u_y - u_c) \qquad (10)$$

As already mentioned, birth-cohorts have been created by grouping households according to head's year of birth, at five-years intervals, excluding from the sample all the households whose head was born after 1969 and before 1915. Eleven cohort dummy variables are then created for each five-year cohort. In the same way, thirteen age dummy variables are created, starting from age 20 and ending with age 84, and ten year dummies are defined for all the years of the sample.

Concerning the econometric specification of model (3), the decomposition of cohort, age and time effects has been carried out, differently from other studies (Jappelli, 1999; Deaton e Paxson, 2000), by using individual data rather than cohort means. As highlighted by Attanasio (1998), the two approaches are equivalent; using individual data is nevertheless preferable since it gives more degrees of freedom in the estimation and allows to control for demographic and socio-economic household characteristics.

*Table 2* Variable descriptions

| VARIABLE | DEFINITION |
|---|---|
| *Demographics* | |
| Male_head | Equals 1 if household's head is male |
| Single | Equals 1 for single adult household without children, zero otherwise |
| Couple+child | Equals 1 for married couples with children, zero otherwise |
| *Education* | |
| Primary_educ | Equals 1 if household's head has a primary education, zero otherwise |
| High_sec_educ | Equals 1 if household's head has a high school education, zero otherwise |
| University_educ | Equals 1 if household's head has a university degree, zero otherwise |
| *Working Status* | |
| Whitecollar | Equals 1 if household's head is in a white collar occupation, zero otherwise |
| Self_employed | Equals 1 if household's head is a self-employed worker, zero otherwise |
| Retired | Equals 1 if household's head has retiredn, zero otherwise |

## 4 ESTIMATION RESULTS

The issue concerning the presence of regional-differentiated consumption, income and saving behaviours is investigated by estimating equations (7), (8) and (10). The cohort-age-time disaggregation has been firstly carried out at the national level, as a benchmark model, and only then it has been separately estimated for the four macro-areas which group Italian regions.

In Section 2 we have already underlined that, working with household data, if family size and composition are not explicitly taken into account the estimated profiles of variables may be distorted. Concerning this aspect, following Miniaci et al. (2003), we include in estimated models the logarithm of the number of equivalent adults as an indicator of household composition heterogeneity (equation 6); estimated coefficients are then tested against the hypothesis of equality to unity, in order to check whether it is necessary to express the dependent variable in per-capita terms. In particular, the estimated coefficients of the number of equivalent adults are equal to 0.45, 0.36 and 0.1, respectively for the regressions of income, consumption and saving rate, implying that taking per-capita values is too strong a correction for household structure.

For completeness, in Figure 8 we present the cohort and age profiles of income and consumption obtained using different corrections for family composition; as it can be noted from the analysis of graphs, the estimated cohort profiles of income and consumption are both shifted downwards when the logarithm of the number of equivalent adults is included in the model as an explanatory variable, while using per-capita values seems to excessively flatten the profiles. On the other hand, the estimated age profiles are affected by the correction mainly in the last part of the lifecycle; moreover, as already shown by Deaton (1997), consumption follows the same age pattern of income, departing from it only for the middle-aged households. Taking into account these empirical evidences, in the analysis of household consumption and saving behaviours disaggregated by region we correct for the effects of family size and composition by including the logarithm of equivalence scale in the estimated equations.

Figure 9 shows the cohort and age profiles of saving rate for Italy in aggregate, obtained by estimating equation (10), which includes the correction for household composition and the controls for demographic and socio-economic effects. The results obtained reveal the presence of a positive and increasing cohort effect which reveals a general and substantial decrease in private saving rates moving from the oldest to the youngest cohorts. In particular, each cohort has a saving rate lower than that of the older cohorts observed at the same age. This result is in line with the general decline in private saving rate, that has characterized Italian economy in the last twenty years, and may be referable to the growing difficulties in generating and accumulating income of the youngest generations (Rossi and Visco, 1995).

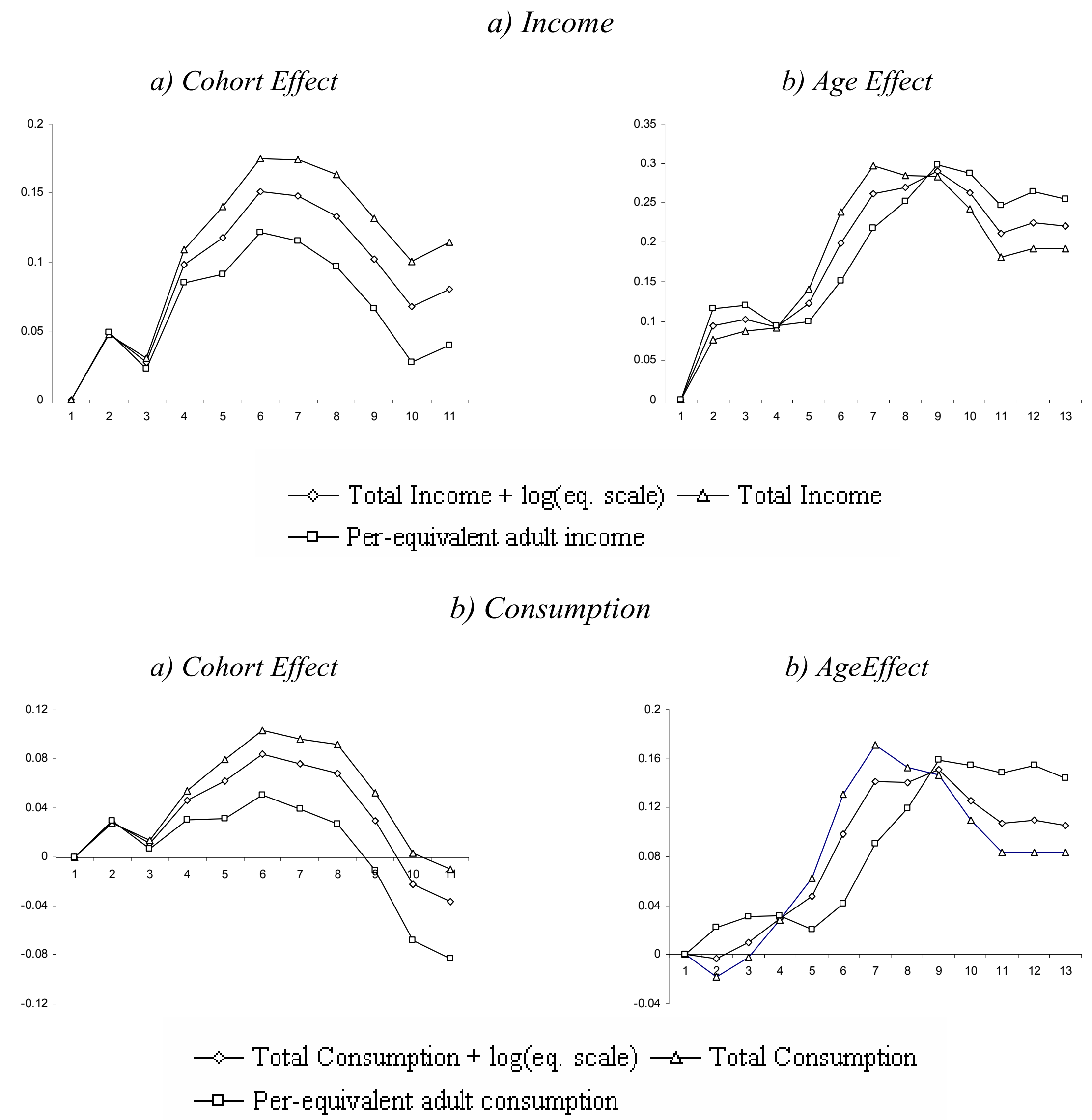



*Figure 8* Cohort and age profiles of income and consumption with different corrections for household structure

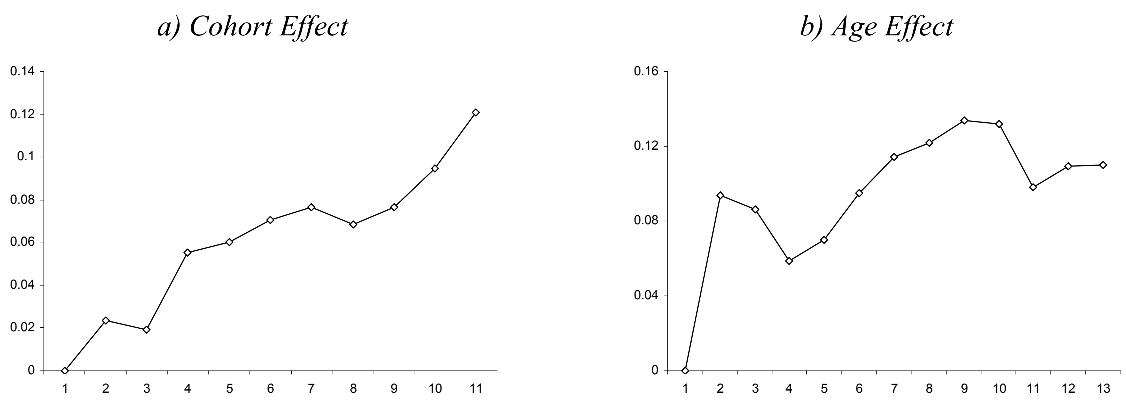



*Figure 9* Cohort and age profiles of saving rate corrected for household structure

In order to account for heterogeneous behaviours in macro-areas, the estimation of cohorts, age and time effects has been carried out for each sub-sample and statistically assessed by Wald tests. The hypothesis test leads to account if, jointly, cohorts or age effects have had significant behaviour changes.

Column 1 of the Table 3.a shows that cohort effects on consumption are significant both for Italy and in the macro-areas at the 5% level. Only the regions of Centre jointly are a *p-value* near the threshold (0.043). The age effect on consumption (column 2) always rejects the hypothesis of difference in behaviour between household's head of different ages.

On the contrary, the statistics test rejects changes across generations for income in the North West and in the Centre regions (Table 3.b). The values of the $\chi^2$ are equal to 1.32 (p-value=0.214) and 1.40 (p-value=0.173), respectively, admitting a stationary behaviour among cohorts in these areas. Moreover, the joint test for age effects rejects differences between households observed at different ages in the Southern regions ($\chi^2 = 1.40$ with p-value=0.159).

Table 3.c shows Wald tests for the saving rate. It is important to denote that since the saving rate is derived by income and consumption variables, we expect similar statistically significance in the cohort, age and time decomposition. Indeed, concentrating our attention in cohort effects, the regions of the Centre of Italy reject the hypothesis of intergenerational changes in the saving rates since in consumption and income cohort decompositions both they do not rejected the null hypothesis. Moreover, we have a significant cohort effects in North West regions likely due to the changes in consumption dynamics compensating slight and non-significant changes in the income.

Figure 10 shows consumption and income profiles of cohort and age effects in macro-areas. In order to account significant intergenerational effects, graphic representations are linked with estimation parameters of Table A.1 and Table A.2 in appendix. The cohort effect of disposable income in the Southern regions assumes a specific profile. Moreover, even if the cohort dynamic of income is similar to that of consumption, the dimension and the statistical significance are both much more marked. It is possible to highlight the presence of a monotone increase from the second cohort (born in 1925-1929) to the 1945-1949 cohort with income that rises of about thirty percent compared to the youngest cohort. In the North East of Italy statistically significant increase in consumption for all cohorts are shown. On the contrary, the income cohort effects are rising and significant only in generations born between the 1915 and 1930 (from cohort 8 to 11), while in the rest of younger cohorts the

*Table 3* Wald test for the joint significance of cohort and age effects and socio-demographic characteristics

*Table 3.a - Consumption*

| Area | Cohort Effect | Age Effect | Demographic characteristics | Education | Working Status | Demo+Educ+ Working |
|---|---|---|---|---|---|---|
| Italy | $\chi^2_{(10)} = 7.35$ *p-value* = 0.000 | $\chi^2_{(12)} = 5.80$ *p-value* = 0.000 | $\chi^2_{(3)} = 181.83$ *p-value* = 0.000 | $\chi^2_{(3)} = 1417.57$ *p-value* = 0.000 | $\chi^2_{(3)} = 79.49$ *p-value* = 0.000 | $\chi^2_{(9)} = 616.39$ *p-value* = 0.000 |
| North West | $\chi^2_{(10)} = 4.84$ *p-value* = 0.000 | $\chi^2_{(12)} = 2.21$ *p-value* = 0.009 | $\chi^2_{(3)} = 26.44$ *p-value* = 0.000 | $\chi^2_{(3)} = 322.55$ *p-value* = 0.000 | $\chi^2_{(3)} = 19.16$ *p-value* = 0.000 | $\chi^2_{(9)} = 136.74$ *p-value* = 0.000 |
| North East | $\chi^2_{(10)} = 11.42$ *p-value* = 0.000 | $\chi^2_{(12)} = 9.82$ *p-value* = 0.000 | $\chi^2_{(3)} = 21.62$ *p-value* = 0.000 | $\chi^2_{(3)} = 247.64$ *p-value* = 0.000 | $\chi^2_{(3)} = 19.35$ *p-value* = 0.000 | $\chi^2_{(9)} = 105.27$ *p-value* = 0.000 |
| Centre | $\chi^2_{(10)} = 1.88$ *p-value* = 0.043 | $\chi^2_{(12)} = 2.56$ *p-value* = 0.002 | $\chi^2_{(3)} = 19.57$ *p-value* = 0.000 | $\chi^2_{(3)} = 261.32$ *p-value* = 0.000 | $\chi^2_{(3)} = 33.30$ *p-value* = 0.000 | $\chi^2_{(9)} = 114.45$ *p-value* = 0.000 |
| South | $\chi^2_{(10)} = 3.95$ *p-value* = 0.000 | $\chi^2_{(12)} = 1.89$ *p-value* = 0.030 | $\chi^2_{(3)} = 69.67$ *p-value* = 0.000 | $\chi^2_{(3)} = 670.04$ *p-value* = 0.000 | $\chi^2_{(3)} = 59.52$ *p-value* = 0.000 | $\chi^2_{(9)} = 303.11$ *p-value* = 0.000 |

*Table 3.b - Income*

| Area | Cohort Effect | Age Effect | Demographic characteristics | Education | Working Status | Demo+Educ+ Working |
|---|---|---|---|---|---|---|
| Italy | $\chi^2_{(10)} = 4.83$ *p-value* = 0.000 | $\chi^2_{(12)} = 7.60$ *p-value* = 0.000 | $\chi^2_{(3)} = 229.94$ *p-value* = 0.000 | $\chi^2_{(3)} = 1460.33$ *p-value* = 0.000 | $\chi^2_{(3)} = 36.39$ *p-value* = 0.000 | $\chi^2_{(9)} = 646.43$ *p-value* = 0.000 |
| North West | $\chi^2_{(10)} = 1.32$ *p-value* = 0.214 | $\chi^2_{(12)} = 3.98$ *p-value* = 0.000 | $\chi^2_{(3)} = 54.10$ *p-value* = 0.000 | $\chi^2_{(3)} = 316.65$ *p-value* = 0.000 | $\chi^2_{(3)} = 9.67$ *p-value* = 0.000 | $\chi^2_{(9)} = 145.85$ *p-value* = 0.000 |
| North East | $\chi^2_{(10)} = 7.58$ *p-value* = 0.000 | $\chi^2_{(12)} = 9.21$ *p-value* = 0.000 | $\chi^2_{(3)} = 30.24$ *p-value* = 0.000 | $\chi^2_{(3)} = 240.71$ *p-value* = 0.000 | $\chi^2_{(3)} = 14.96$ *p-value* = 0.000 | $\chi^2_{(9)} = 106.35$ *p-value* = 0.000 |
| Centre | $\chi^2_{(10)} = 1.40$ *p-value* = 0.173 | $\chi^2_{(12)} = 2.79$ *p-value* = 0.001 | $\chi^2_{(3)} = 33.07$ *p-value* = 0.000 | $\chi^2_{(3)} = 224.12$ *p-value* = 0.000 | $\chi^2_{(3)} = 20.97$ *p-value* = 0.000 | $\chi^2_{(9)} = 107.21$ *p-value* = 0.000 |
| South | $\chi^2_{(10)} = 4.67$ *p-value* = 0.000 | $\chi^2_{(12)} = 1.40$ *p-value* = 0.159 | $\chi^2_{(3)} = 54.90$ *p-value* = 0.000 | $\chi^2_{(3)} = 876.36$ *p-value* = 0.000 | $\chi^2_{(3)} = 33.17$ *p-value* = 0.000 | $\chi^2_{(9)} = 369.64$ *p-value* = 0.000 |

*Table 3.c - Saving Rate*

| Area | Cohort Effect | Age Effect | Demographic characteristics | Education | Working Status | Demo+Educ+ Working |
|---|---|---|---|---|---|---|
| Italy | $\chi^2_{(10)} = 2.41$ *p-value* = 0.007 | $\chi^2_{(12)} = 2.75$ *p-value* = 0.001 | $\chi^2_{(3)} = 59.04$ *p-value* = 0.000 | $\chi^2_{(3)} = 234.55$ *p-value* = 0.000 | $\chi^2_{(3)} = 4.43$ *p-value* = 0.000 | $\chi^2_{(9)} = 111.37$ *p-value* = 0.000 |
| North West | $\chi^2_{(10)} = 2.45$ *p-value* = 0.006 | $\chi^2_{(12)} = 2.18$ *p-value* = 0.010 | $\chi^2_{(3)} = 16.04$ *p-value* = 0.000 | $\chi^2_{(3)} = 45.37$ *p-value* = 0.000 | $\chi^2_{(3)} = 4.52$ *p-value* = 0.004 | $\chi^2_{(9)} = 25.83$ *p-value* = 0.000 |
| North East | $\chi^2_{(10)} = 2.30$ *p-value* = 0.011 | $\chi^2_{(12)} = 1.24$ *p-value* = 0.251 | $\chi^2_{(3)} = 16.19$ *p-value* = 0.000 | $\chi^2_{(3)} = 38.11$ *p-value* = 0.000 | $\chi^2_{(3)} = 0.59$ *p-value* = 0.624 | $\chi^2_{(9)} = 19.36$ *p-value* = 0.000 |
| Centre | $\chi^2_{(10)} = 1.17$ *p-value* = 0.303 | $\chi^2_{(12)} = 1.14$ *p-value* = 0.321 | $\chi^2_{(3)} = 17.44$ *p-value* = 0.000 | $\chi^2_{(3)} = 23.52$ *p-value* = 0.000 | $\chi^2_{(3)} = 0.68$ *p-value* = 0.567 | $\chi^2_{(9)} = 15.15$ *p-value* = 0.000 |
| South | $\chi^2_{(10)} = 1.83$ *p-value* = 0.051 | $\chi^2_{(12)} = 2.03$ *p-value* = 0.018 | $\chi^2_{(3)} = 11.64$ *p-value* = 0.000 | $\chi^2_{(3)} = 153.05$ *p-value* = 0.000 | $\chi^2_{(3)} = 2.69$ *p-value* = 0.044 | $\chi^2_{(9)} = 62.66$ *p-value* = 0.000 |

intergenerational income parameters are not significant. Moreover, in the regions of North West the intergenerational profile of consumption shows a decreasing trend of the new cohorts and constantly over the income profile. We remark that joint tests in Table 2b show that cohort effects are statistically significant deriving important consequence for saving rate, even if only the parameter of the cohort 6 of income is significant.

Summarizing, this heterogeneity in generating income flows (or household purchasing power) among successive generations supports the evidence of a persistent difference of wealth (and income growth) between Northern and Southern regions. As it will be shown after, this implies that in the South of Italy there has been a reduction in private savings rate targeted to consumption level maintenance, revealing that younger generation in the South are not able to spark economic growth.

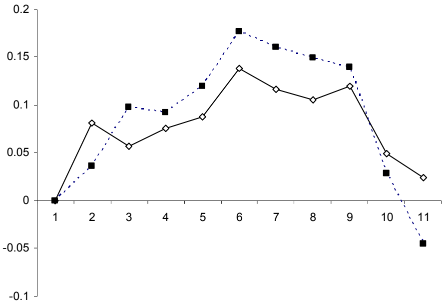
The estimated age effects reveal significant differences between Northern and Southern regions. The estimated patterns show an increasing age profile in the regions of the North, with oldest individuals presenting higher levels of both income and consumption. In particular, the dynamics of consumption, that appears to be in contrast with the predictions of the life-cycle hypothesis, finds support in the results obtained by Deaton (1997) and suggests that the age structure of consumption is strictly connected with that of disposable income. Turning to the regional analysis, the higher growth rates in the North East, and partially in the North West, may help in explaining the increase in consumption levels.

On the other hand, the age profile of consumption in the South is slightly decreasing and completely different from income profile. However, given that all the parameters, with the exception of the last two, are not significantly different from zero, suggesting that consumption in the South remains stable over the life-cycle.

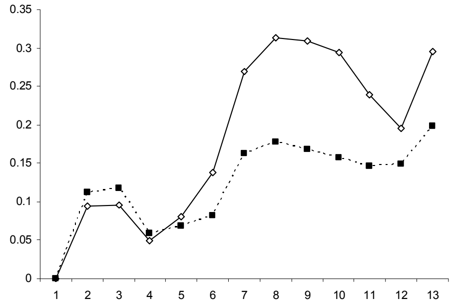
In order to show relevance of socio demographic variables in the econometric model estimation, let us consider a restricted version of eqs. (7) (8) and (10), excluding the variables reported in Table 2, related to education status of household's head. We do not report detailed parameter estimation of this restricted version, but it is obvious from significance tests of Table 3 that education effects are quite precisely estimated, as reflected by high p-values for all macro-areas and for all three variables in column "education" in Table 3.

*North West*

*a) Cohort Effect*

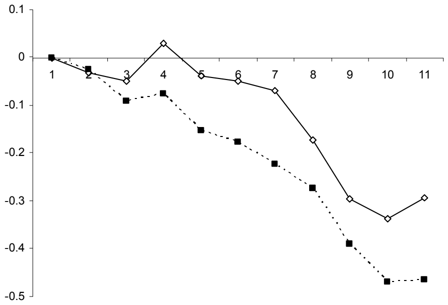



*b) Age Effect*

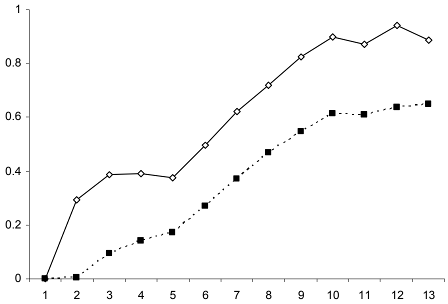



*North East*

*a) Cohort Effect*

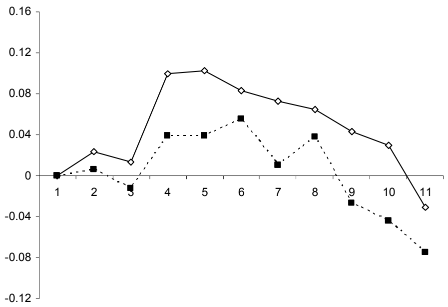



*b) Age Effect*

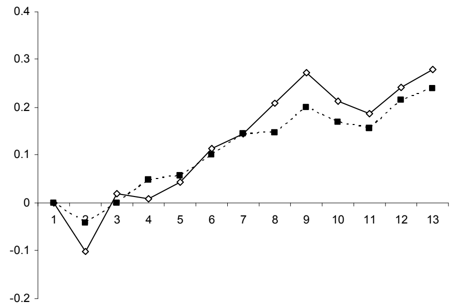



*Centre*

*a) Cohort Effect*

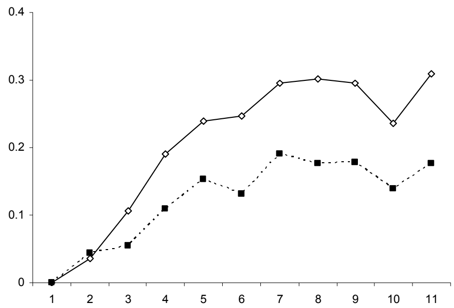



*b) Age Effect*




*South*

*a) Cohort Effect*




*b) Age Effect*

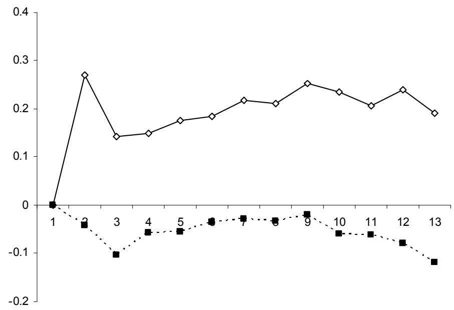



*Figure 10* – Estimated cohort and age profiles of income and consumption disaggregated by macro-region

Figure 11 depicts cohort effect profiles on savings rate with and without education variables. Solid lines for the four macro-regions represent estimations in the complete model and it is quite interesting to analyse differences of the restricted model with respect to dotted lines. This is an effective way to assess the effect of education on savings behaviour, although admittedly not the most precise in econometric terms. In fact, it would be possible to recover marginal effect of each education variable (such as the level of schooling attained by the household's head), inferring it from estimated coefficients of the complete model.

Investigating cohort profiles of saving rate parameters in the complete model (Table A.3 in Appendix) we notice decreasing intergenerational values and a high significance in the North East and in the South of Italy, justifying the profile previously obtained in aggregate (Figure 9) and supporting the empirical macroeconomic evidence of private savings rate reduction (Rossi and Visco, 1995). However, differences in saving rates at the regional dimension, caused by heterogeneous level of productivity, was already found in Bollino (1996) and Bollino and Magnani (1997). In this context, we add that the inability to generate income in younger generations of the Southern regions could be seen as a long-run problem that it has not had complete effects.

In order to explain how the saving rate dependent on differences of the education variable, we analyse the restricted profiles plotted in Figure 11. Notice that education level is positively correlated with savings for all cohorts, but difference is not sizeable for cohorts 1-3 in all regions; it becomes only moderately positive (i.e., higher for households born before 1950) in North West, North East and Centre, but it is much wider in the case of South. Notice, in addition, that such difference is more sizable in Centre with respect to the two Northern regions. This is not surprising, depicting a clear pattern from North to South of Italy. Thus for cohorts born before 1950 in the South, education effect explains a large proportion of savings behaviour. In the South, older generations were more effective than younger to contribute to savings. This is generally so for the whole country, but much more so for the South.

Moreover, given that it is in the South that there is a relatively greater drop in savings rate and that this is largely due to education effect, we may conclude that education has a relevant role in explaining why younger generation in the South are not able to spur economic growth.

Thus, lack of adequate education or, in other words, insufficient individual human capital build up is a cause for inadequate savings formation in the South. This micro-founded suggestion may well stand up to complement more traditional or institutional explanations, such as reduction of capital subsidies (e.g., "*Cassa per il Mezzogiorno*"). As obvious as it may seem, education is a cornerstone for building capability to produce income and accumulate savings.

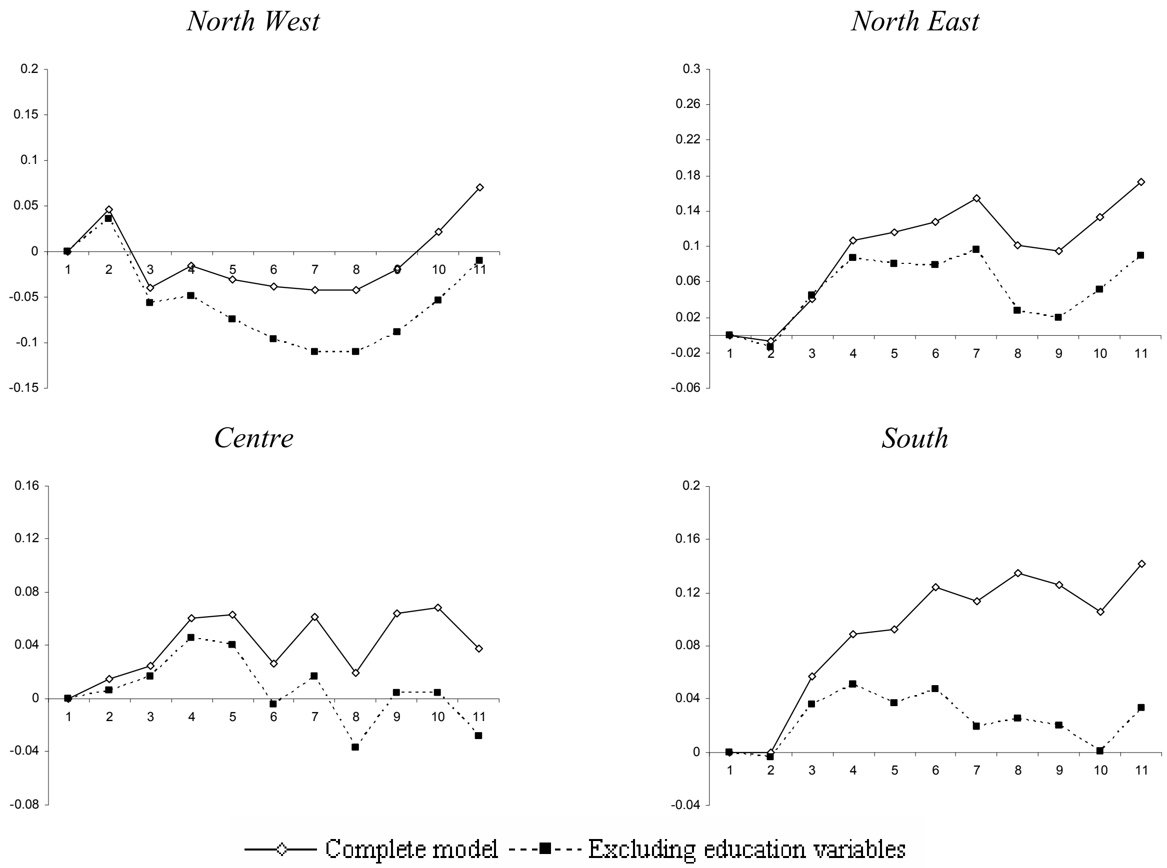



*Figure 11* Analysing the effect of education variables on intergenerational saving rate patterns

## 5 CONCLUSIONS

The aim of this paper is to explain two empirical facts recorded in the last decades in Italy concerning the persistence in income differences between Northern and Southern regions and the decrease in private saving rates. To obtain an univocal framework to analyze income and saving, encompassing both microeconomic and aggregate perspective, we use the life-cycle model predicting that a higher growth rate leads to increasing saving in the younger generations. On the contrary, if younger generations are not able to generate income level to maintain standard consumption, it is likely that aggregate saving rates decrease.

In order to present a rigorous and comprehensive account of the previous stylized facts, a cohort, age and time decomposition of household disposable income and consumption, for both the Italian economy and regional macro-areas, was used. In particular, cohort effects allowed to assess changes across generations in income and consumption behaviours and, consequently, in saving rate. Empirical analysis uses a series of repeated cross-sections from 1989 to 2002 of the Bank of Italy's Survey of Household Income and Wealth.

Estimated cohort profiles of income, consumption and saving rates are coherent with the previous facts, showing heterogeneous shapes for regional macro-areas. We obtain significant and growing income cohort parameters for the oldest generations of North East, while in the Southern regions we have statistically significant and decreasing cohort effects for all generations.

As for consumption behaviours, we obtain the same intergenerational pictures of income; some exceptions concern the high and statistically significant increase in consumption for the youngest generations of the North East and the convergence to the income level, with a lower rate of reduction of consumption, in the youngest generations of the Southern regions. This heterogeneity in generating income flows, dependent on productivity of successive generations, supports the evidence of a persistent difference of wealth (and income growth) between Northern and Southern regions.

Finally, cohort changes in saving rates explain its drop in the Italian economy both as a intergenerational inability to generate income in households of the Southern regions and as a hard increase of consumption in younger cohorts of the Northern regions, while contributions to behaviour changes across generations of others macro-areas are not statistically significant.

In order to explain heterogeneous behaviours in saving rates and to improve the efficiency of policies, the sensitivity analysis is used assessing education levels among macro-areas. We find a pattern from North to South of Italy, in which only the cohorts born before 1950 in the South could explain a large proportion of savings behaviour and that this is largely due to education effect. In fact, the lack of education or human capital can explain a lower economic growth in younger generations in the South of Italy and, in the context of the lifecycle hypothesis, it represents a main cause for inadequate savings formation.

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## APPENDIX

*Table A.1* Estimated coefficient for income, disaggregated by macro-region

| Variable | North West | | North East | | Centre | | South | |
|---|---|---|---|---|---|---|---|---|
| | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error |
| Cohort 2 | 0.0812 | (0.045) | -0.0324 | (0.047) | 0.0234 | (0.057) | 0.0358 | (0.046) |
| Cohort 3 | 0.0569 | (0.047) | -0.0499 | (0.047) | 0.0132 | (0.058) | 0.1063 | (0.048) |
| Cohort 4 | 0.0754 | (0.053) | 0.0301 | (0.056) | 0.0997 | (0.063) | 0.1914 | (0.053) |
| Cohort 5 | 0.0877 | (0.058) | -0.0375 | (0.066) | 0.1030 | (0.066) | 0.2386 | (0.056) |
| Cohort 6 | 0.1380 | (0.065) | -0.0494 | (0.067) | 0.0830 | (0.071) | 0.2469 | (0.062) |
| Cohort 7 | 0.1167 | (0.067) | -0.0691 | (0.072) | 0.0729 | (0.074) | 0.2956 | (0.068) |
| Cohort 8 | 0.1060 | (0.070) | -0.1730 | (0.075) | 0.0648 | (0.077) | 0.3022 | (0.070) |
| Cohort 9 | 0.1196 | (0.071) | -0.2967 | (0.078) | 0.0432 | (0.081) | 0.2957 | (0.072) |
| Cohort 10 | 0.0496 | (0.073) | -0.3374 | (0.081) | 0.0294 | (0.082) | 0.2356 | (0.073) |
| Cohort 11 | 0.0242 | (0.080) | -0.2943 | (0.087) | -0.0312 | (0.087) | 0.3097 | (0.076) |
| Age 2 | 0.0937 | (0.099) | 0.2937 | (0.202) | -0.1006 | (0.121) | 0.2710 | (0.173) |
| Age 3 | 0.0961 | (0.098) | 0.3849 | (0.189) | 0.0205 | (0.096) | 0.1434 | (0.171) |
| Age 4 | 0.0494 | (0.099) | 0.3921 | (0.191) | 0.0097 | (0.105) | 0.1484 | (0.173) |
| Age 5 | 0.0803 | (0.102) | 0.3756 | (0.199) | 0.0438 | (0.107) | 0.1752 | (0.175) |
| Age 6 | 0.1379 | (0.105) | 0.4969 | (0.199) | 0.1145 | (0.109) | 0.1842 | (0.176) |
| Age 7 | 0.2699 | (0.109) | 0.6226 | (0.201) | 0.1447 | (0.111) | 0.2176 | (0.178) |
| Age 8 | 0.3128 | (0.115) | 0.7174 | (0.203) | 0.2092 | (0.114) | 0.2115 | (0.181) |
| Age 9 | 0.3089 | (0.115) | 0.8247 | (0.204) | 0.2732 | (0.117) | 0.2536 | (0.182) |
| Age 10 | 0.2943 | (0.119) | 0.8980 | (0.205) | 0.2142 | (0.119) | 0.2351 | (0.183) |
| Age 11 | 0.2388 | (0.117) | 0.8694 | (0.206) | 0.1858 | (0.123) | 0.2075 | (0.183) |
| Age 12 | 0.1957 | (0.120) | 0.9399 | (0.207) | 0.2421 | (0.125) | 0.2394 | (0.185) |
| Age 13 | 0.2956 | (0.128) | 0.8868 | (0.212) | 0.2799 | (0.130) | 0.1905 | (0.188) |
| Year 3 | -0.0354 | (0.016) | 0.0104 | (0.020) | 0.0110 | (0.020) | -0.0216 | (0.014) |
| Year 4 | -0.0385 | (0.015) | -0.0282 | (0.015) | -0.0412 | (0.016) | -0.0614 | (0.014) |
| Year 5 | -0.0594 | (0.019) | -0.0031 | (0.016) | -0.0272 | (0.021) | -0.0383 | (0.016) |
| Year 6 | -0.0063 | (0.014) | -0.0006 | (0.018) | -0.0123 | (0.015) | 0.0163 | (0.014) |
| Year 7 | 0.0646 | (0.012) | 0.0087 | (0.014) | 0.0312 | (0.014) | 0.0348 | (0.012) |
| Ln(eq_ad) | 0.6763 | (0.052) | 0.7969 | (0.038) | 0.7507 | (0.037) | 0.5391 | (0.033) |
| Male_head | 0.1409 | (0.018) | 0.0674 | (0.019) | 0.1513 | (0.021) | 0.1073 | (0.018) |
| Single | -0.1836 | (0.032) | -0.2453 | (0.033) | -0.0902 | (0.035) | -0.2086 | (0.028) |
| Couple+child | -0.0052 | (0.022) | -0.0185 | (0.018) | -0.0803 | (0.017) | -0.0130 | (0.017) |
| Primary_educ | -0.1104 | (0.018) | -0.1062 | (0.018) | -0.0833 | (0.018) | -0.0728 | (0.014) |
| High_sec_educ | 0.3086 | (0.017) | 0.2883 | (0.021) | 0.3019 | (0.019) | 0.4790 | (0.017) |
| University_educ | 0.6867 | (0.028) | 0.6188 | (0.028) | 0.6395 | (0.035) | 0.8923 | (0.021) |
| Whitecollar | 0.0996 | (0.033) | 0.0433 | (0.041) | 0.1134 | (0.035) | 0.1711 | (0.027) |
| Self_employed | 0.2728 | (0.067) | 0.1062 | (0.048) | 0.2543 | (0.039) | 0.2738 | (0.030) |
| Retired | -0.0946 | (0.027) | -0.1401 | (0.023) | -0.0661 | (0.027) | -0.0081 | (0.022) |
| Constant | 9.2174 | (0.091) | 9.0293 | (0.188) | 9.1799 | (0.090) | 8.6557 | (0.168) |
| Sample size | 12471 | | 9929 | | 10895 | | 24922 | |
| $R^2$ | 0.4338 | | 0.4066 | | 0.3466 | | 0.3449 | |

***Notes:***
The coefficients are weighted using Bank of Italy's sample weights.
Robust standard errors in brackets

*Table A.2* Estimated coefficient for consumption, disaggregated by macro-region

| Variable | North West | | North East | | Centre | | South | |
|---|---|---|---|---|---|---|---|---|
| | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error |
| Cohort 2 | 0.0361 | (0.034) | -0.0250 | (0.027) | 0.0064 | (0.030) | 0.0440 | (0.027) |
| Cohort 3 | 0.0975 | (0.036) | -0.0907 | (0.029) | -0.0120 | (0.033) | 0.0550 | (0.028) |
| Cohort 4 | 0.0922 | (0.040) | -0.0753 | (0.034) | 0.0386 | (0.036) | 0.1091 | (0.032) |
| Cohort 5 | 0.1197 | (0.044) | -0.1520 | (0.040) | 0.0394 | (0.040) | 0.1536 | (0.034) |
| Cohort 6 | 0.1768 | (0.051) | -0.1767 | (0.043) | 0.0554 | (0.044) | 0.1310 | (0.038) |
| Cohort 7 | 0.1605 | (0.053) | -0.2221 | (0.047) | 0.0100 | (0.047) | 0.1900 | (0.042) |
| Cohort 8 | 0.1489 | (0.056) | -0.2738 | (0.051) | 0.0380 | (0.053) | 0.1761 | (0.044) |
| Cohort 9 | 0.1397 | (0.057) | -0.3901 | (0.054) | -0.0269 | (0.057) | 0.1784 | (0.046) |
| Cohort 10 | 0.0291 | (0.060) | -0.4697 | (0.056) | -0.0444 | (0.058) | 0.1387 | (0.047) |
| Cohort 11 | -0.0448 | (0.068) | -0.4656 | (0.060) | -0.0747 | (0.064) | 0.1766 | (0.051) |
| Age 2 | 0.1128 | (0.076) | 0.0025 | (0.095) | -0.0426 | (0.078) | -0.0408 | (0.062) |
| Age 3 | 0.1181 | (0.072) | 0.0938 | (0.090) | -0.0003 | (0.075) | -0.1044 | (0.060) |
| Age 4 | 0.0584 | (0.075) | 0.1399 | (0.091) | 0.0490 | (0.076) | -0.0573 | (0.062) |
| Age 5 | 0.0677 | (0.077) | 0.1721 | (0.093) | 0.0575 | (0.078) | -0.0541 | (0.064) |
| Age 6 | 0.0818 | (0.079) | 0.2699 | (0.095) | 0.1009 | (0.081) | -0.0344 | (0.065) |
| Age 7 | 0.1625 | (0.082) | 0.3726 | (0.097) | 0.1451 | (0.081) | -0.0293 | (0.068) |
| Age 8 | 0.1776 | (0.085) | 0.4681 | (0.099) | 0.1480 | (0.085) | -0.0340 | (0.069) |
| Age 9 | 0.1684 | (0.087) | 0.5476 | (0.102) | 0.2005 | (0.087) | -0.0194 | (0.072) |
| Age 10 | 0.1576 | (0.090) | 0.6132 | (0.104) | 0.1689 | (0.090) | -0.0590 | (0.073) |
| Age 11 | 0.1465 | (0.090) | 0.6095 | (0.105) | 0.1569 | (0.093) | -0.0614 | (0.074) |
| Age 12 | 0.1492 | (0.093) | 0.6357 | (0.107) | 0.2162 | (0.095) | -0.0802 | (0.076) |
| Age 13 | 0.1982 | (0.101) | 0.6469 | (0.114) | 0.2396 | (0.100) | -0.1176 | (0.079) |
| Year 3 | 0.0084 | (0.013) | 0.0164 | (0.012) | 0.0399 | (0.013) | 0.0031 | (0.010) |
| Year 4 | 0.0188 | (0.011) | 0.0475 | (0.011) | 0.0403 | (0.012) | 0.0302 | (0.010) |
| Year 5 | -0.0839 | (0.014) | -0.0196 | (0.012) | -0.0617 | (0.014) | -0.0603 | (0.010) |
| Year 6 | 0.0004 | (0.011) | 0.0046 | (0.010) | -0.0079 | (0.011) | -0.0131 | (0.009) |
| Year 7 | 0.0411 | (0.010) | -0.0137 | (0.009) | 0.0082 | (0.010) | 0.0324 | (0.008) |
| Ln(eq_ad) | 0.6158 | (0.038) | 0.6075 | (0.030) | 0.5163 | (0.027) | 0.4002 | (0.024) |
| Male_head | 0.0874 | (0.013) | 0.0429 | (0.013) | 0.0891 | (0.014) | 0.0884 | (0.012) |
| Single | -0.0994 | (0.024) | -0.1283 | (0.023) | -0.0771 | (0.024) | -0.1589 | (0.019) |
| Couple+child | -0.0030 | (0.016) | 0.0395 | (0.014) | -0.0049 | (0.013) | 0.0417 | (0.012) |
| Primary_educ | -0.0995 | (0.013) | -0.0942 | (0.013) | -0.0758 | (0.013) | -0.0416 | (0.009) |
| High_sec_educ | 0.2290 | (0.013) | 0.1854 | (0.012) | 0.2298 | (0.014) | 0.3241 | (0.011) |
| University_educ | 0.4840 | (0.023) | 0.4143 | (0.020) | 0.4657 | (0.023) | 0.6132 | (0.018) |
| Whitecollar | 0.0178 | (0.026) | 0.0421 | (0.033) | 0.1070 | (0.030) | 0.1377 | (0.021) |
| Self_employed | 0.2160 | (0.035) | 0.1365 | (0.036) | 0.2493 | (0.032) | 0.2517 | (0.021) |
| Retired | -0.0785 | (0.020) | -0.1228 | (0.019) | -0.0883 | (0.020) | -0.0466 | (0.015) |
| Constant | 8.9720 | (0.068) | 9.1155 | (0.090) | 9.1069 | (0.073) | 8.8597 | (0.058) |
| Sample size | 12485 | | 9930 | | 10904 | | 18727 | |
| $R^2$ | 0.4654 | | 0.4439 | | 0.3957 | | 0.4199 | |

***Notes:***
The coefficients are weighted using Bank of Italy's sample weights.
Robust standard errors in brackets

*Table A.3* Estimated coefficient for saving rate, disaggregated by macro-region

| Variable | North West | | North East | | Centre | | South | |
|---|---|---|---|---|---|---|---|---|
| | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error | Coeff. | Std. Error |
| Cohort 2 | 0.0463 | (0.033) | -0.0069 | (0.041) | 0.0154 | (0.049) | -0.0006 | (0.038) |
| Cohort 3 | -0.0396 | (0.034) | 0.0400 | (0.039) | 0.0244 | (0.046) | 0.0575 | (0.040) |
| Cohort 4 | -0.0158 | (0.040) | 0.1066 | (0.049) | 0.0609 | (0.050) | 0.0890 | (0.044) |
| Cohort 5 | -0.0310 | (0.043) | 0.1159 | (0.058) | 0.0632 | (0.053) | 0.0923 | (0.046) |
| Cohort 6 | -0.0388 | (0.049) | 0.1284 | (0.058) | 0.0267 | (0.056) | 0.1238 | (0.050) |
| Cohort 7 | -0.0424 | (0.050) | 0.1543 | (0.062) | 0.0613 | (0.058) | 0.1136 | (0.055) |
| Cohort 8 | -0.0417 | (0.052) | 0.1020 | (0.065) | 0.0197 | (0.058) | 0.1344 | (0.056) |
| Cohort 9 | -0.0188 | (0.053) | 0.0947 | (0.066) | 0.0645 | (0.060) | 0.1256 | (0.057) |
| Cohort 10 | 0.0218 | (0.057) | 0.1336 | (0.068) | 0.0683 | (0.061) | 0.1052 | (0.057) |
| Cohort 11 | 0.0703 | (0.060) | 0.1726 | (0.072) | 0.0376 | (0.063) | 0.1414 | (0.059) |
| Age 2 | -0.0209 | (0.085) | 0.2912 | (0.155) | -0.0576 | (0.090) | 0.3050 | (0.142) |
| Age 3 | -0.0229 | (0.084) | 0.2912 | (0.140) | 0.0199 | (0.063) | 0.2375 | (0.142) |
| Age 4 | -0.0104 | (0.085) | 0.2521 | (0.143) | -0.0396 | (0.073) | 0.1969 | (0.144) |
| Age 5 | 0.0113 | (0.088) | 0.2016 | (0.154) | -0.0154 | (0.074) | 0.2220 | (0.144) |
| Age 6 | 0.0553 | (0.090) | 0.2258 | (0.151) | 0.0125 | (0.075) | 0.2079 | (0.146) |
| Age 7 | 0.1053 | (0.092) | 0.2486 | (0.154) | -0.0012 | (0.077) | 0.2382 | (0.147) |
| Age 8 | 0.1307 | (0.096) | 0.2480 | (0.155) | 0.0575 | (0.079) | 0.2356 | (0.149) |
| Age 9 | 0.1377 | (0.095) | 0.2759 | (0.156) | 0.0730 | (0.082) | 0.2632 | (0.149) |
| Age 10 | 0.1337 | (0.098) | 0.2836 | (0.157) | 0.0467 | (0.082) | 0.2851 | (0.150) |
| Age 11 | 0.0893 | (0.098) | 0.2589 | (0.157) | 0.0319 | (0.084) | 0.2600 | (0.150) |
| Age 12 | 0.0436 | (0.099) | 0.3031 | (0.158) | 0.0291 | (0.086) | 0.3106 | (0.151) |
| Age 13 | 0.0946 | (0.106) | 0.2388 | (0.162) | 0.0440 | (0.089) | 0.2998 | (0.155) |
| Year 3 | -0.0434 | (0.013) | -0.0058 | (0.017) | -0.0288 | (0.017) | -0.0247 | (0.011) |
| Year 4 | -0.0578 | (0.011) | -0.0767 | (0.012) | -0.0810 | (0.012) | -0.0920 | (0.011) |
| Year 5 | 0.0246 | (0.015) | 0.0166 | (0.013) | 0.0350 | (0.017) | 0.0228 | (0.013) |
| Year 6 | -0.0059 | (0.011) | -0.0051 | (0.016) | -0.0042 | (0.012) | 0.0296 | (0.011) |
| Year 7 | 0.0229 | (0.010) | 0.0226 | (0.012) | 0.0224 | (0.012) | 0.0016 | (0.010) |
| Ln(eq_ad) | 0.0604 | (0.038) | 0.1904 | (0.031) | 0.2363 | (0.030) | 0.1391 | (0.023) |
| Male_head | 0.0530 | (0.013) | 0.0252 | (0.015) | 0.0619 | (0.016) | 0.0192 | (0.014) |
| Single | -0.0850 | (0.023) | -0.1160 | (0.029) | -0.0165 | (0.027) | -0.0507 | (0.021) |
| Couple+child | -0.0020 | (0.017) | -0.0577 | (0.015) | -0.0749 | (0.013) | -0.0539 | (0.012) |
| Primary_educ | -0.0107 | (0.013) | -0.0116 | (0.014) | -0.0084 | (0.014) | -0.0322 | (0.011) |
| High_sec_educ | 0.0794 | (0.013) | 0.1035 | (0.018) | 0.0721 | (0.015) | 0.1571 | (0.014) |
| University_educ | 0.2031 | (0.019) | 0.2052 | (0.022) | 0.1745 | (0.025) | 0.2814 | (0.016) |
| Whitecollar | 0.0829 | (0.023) | 0.0007 | (0.029) | 0.0067 | (0.022) | 0.0359 | (0.019) |
| Self_employed | 0.0580 | (0.047) | -0.0306 | (0.035) | 0.0071 | (0.026) | 0.0259 | (0.021) |
| Retired | -0.0143 | (0.021) | -0.0172 | (0.018) | 0.0264 | (0.019) | 0.0412 | (0.017) |
| Constant | 0.2459 | (0.080) | -0.0879 | (0.139) | 0.0731 | (0.058) | -0.2058 | (0.139) |
| Sample size | 12471 | | 9929 | | 10895 | | 18624 | |
| $R^2$ | 0.0685 | | 0.0831 | | 0.0649 | | 0.0730 | |

***Notes:***
The coefficients are weighted using Bank of Italy's sample weights.
Robust standard errors in brackets