Income and Wealth Volatility:

Evidence from Italy and the U.S. in the Past Two Decades*

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Abstract

Income volatility and wealth volatility are central objects of investigation for the literature on income and wealth inequality and dynamics. Here we analyse the two concepts in a comparative perspective for the same individuals in Italy and the U.S. over the last two decades. We find that in both countries wealth volatility reaches significantly higher values than income volatility, the effect being mostly driven by changes in the market value of real estate assets. We also show that there is more volatility in both dimensions in the U.S. and that the overall trend in both countries is increasing over time. We conclude by exploring volatility in consumption.

Keywords: Income volatility, Wealth volatility, PSID, SHIW

JEL Classification Codes: D31

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1. Introduction

Income volatility has risen in a number of OECD countries in the recent past (Bartels and Bönke, 2010, 2013; Daly and Valletta, 2008; Dynan et al., 2012; Jappelli and Pistaferri, 2010). Most of the literature has focussed on the U.S., documenting a moderate to large increase in household income volatility from the 1970s to the 2000s, with a variety of different data sources and methods (DeBacker et al., 2012; Dynan et al., 2012; Hacker and Jacobs, 2008; Hacker, 2019; Shin and Solon, 2011; Winship, 2009). The financial lives of individuals and households is increasingly subject to instability and unpredictability, due to changes in labour earnings, access to welfare, and family composition. However, less is known about individual wealth volatility in a comparative perspective, especially in relationship to income instability. Wealth inequality is known to be typically higher than income inequality in the U.S. (Conley and Glauber, 2008). These findings are confirmed by Fisher et al. (2016) and Johnson and Fisher (2018), who look at the relationship between inequality and mobility in income, wealth, and consumption for the same individuals. However, volatility is hardly ever addressed. One exception is the work of Whalley and Yue (2009), who use Chinese data to investigate rural income inequality and argue that higher income volatility exacerbates income inequality, as well as poverty concerns.

In this paper we investigate the relationship between income and wealth volatility in Italy and in the United States, the only two countries for which, to the best of our knowledge, data is available for more than a decade at the household and individual level. In order to do so, we adopt a range of descriptive measures typically used in the realm of income and earnings volatility, and apply them to both equivalised income and equivalised wealth following the tradition of the literature on the measurement of individual wellbeing. In particular, we apply a battery of variance decomposition methods developed by Gottschalk and Moffit (1994, 2002, 2012), in order to disentangle a transitory component from a permanent component of the variances of income and wealth. We base our empirical analysis by calculating individual equivalised income and wealth from household longitudinal data from the United States (the Panel Study of Income Dynamics, from here onwards PSID) and Italy (Banca d'Italia's Survey on Household Income and Wealth, from here onwards SHIW). The panel dimension of these datasets, together with their focus on income processes and assets distribution, make them the perfect candidates for our purpose.

Several papers have documented an increase in household income volatility using PSID over the last few decades. While most studies unanimously report an increasing trend in income volatility in the U.S., there is no consensus on the magnitude of the effect – the differences between estimates being mostly driven by measurement issues and sample selection. Using the transitory component of the variance of log income, Hacker and Jacobs (2008) find that household income volatility doubled between the late 1960s and the early 2000s; Winship (2009), on the other hand, reports a more modest 30% increase in income volatility, measured as the standard deviation of the two-year percentage change of income, around the same period. See Dynan et al. (2012) for a thorough review of studies on earnings and household income volatility in the U.S.. While wealth in PSID has been linked to macroeconomic volatility (Fang et al., 2015; Heathcote and Perri, 2018; Stiglitz, 2012), little to nothing has been said on household wealth volatility over time. One exception is Conley and Glauber (2008), who measure wealth volatility in PSID as changes in average and median wealth across time and find that more than one-third of adults experience at least one $1,000 drop in their inflation-adjusted wealth before retirement.

With regard to Italy, Boeri and Brandolini in 2004 use SHIW to investigate whether the impoverishment of Italian households was partly attributable to higher income volatility. They perform their analysis at the individual level, using equivalised household income. Although referring to income volatility, the authors focus their attention on income mobility measures and report that mobility in Italy increased noticeably from the mid-1990s to the early 2000s. Diaz-Serrano (2005), using the SHIW rotatory panel from 1986 to 2000, estimates transitory shocks in labour income as the residuals from a Mincerian equation and finds a level of labour income uncertainty (measured as the variance of individual level residuals over time) of 0.264 across the whole sample of male earners. Using more recent waves of the panel component of the SHIW, Jappelli and Pistaferri (2010) highlight that in 2006 the variance of earnings per adult equivalent is almost 0.5, higher than the variance of raw earnings. As for the analysis of wealth, Brandolini et al. (2006) find a steady increase in wealth inequality in SHIW during the 1990s, mostly due to a larger concentration of financial wealth.

There are several papers that compare income and wealth variance (or inequality) on a theoretical level. One of the most notable is Deaton and Paxson (1994). They conclude that "Assets are the sum of previous saving and so will be an I(2) process, whose cross-sectional variance will therefore expand more rapidly than that of either consumption or disposable income" [p. 460]. However, the paper does not directly address the issue of whether wealth volatility (over time) is greater than income volatility.

DeNardi and Fella (2017) survey the savings mechanisms generated by a number of factors, concluding that the transmission of bequests and human capital, entrepreneurship, and medical-expense risk are crucial determinants of savings and wealth inequality. Their analysis begins with the basic Bewley (1977) model which features an incomplete market environment in which people save to self-insure against earnings shocks. In this framework, precautionary savings in the face of earnings risk is the key force driving wealth concentration. However, since the ability to self-insure improves as wealth increases relative to earnings, the model implies that the saving rate decreases with net worth relative to earnings, which is inconsistent with empirical findings. They then consider several other factors. The first is the intergenerational transmission of bequests and human capital. While introducing voluntary bequests generates more wealth concentration at the top, it also happens that, when calibrated using a standard earning process, this resultant economy has too many poor households. The second is heterogeneous preferences. However, when calibrated, this factor has limited success in generating realistic inequality throughout the entire wealth distribution. The third force is earnings dynamics. With the key assumption that that earning shocks are log-normally distributed, the main result is that the model predicts well the savings of the bottom 60% of the wealth distribution but does not generate the kind of saving behaviour at the top that is necessary to lead to a high concentration of wealth among the very rich.

The fourth set of forces are medical expense risk and heterogeneity in life expectancy. On the basis of the well-established finding that richer people live significantly longer, the introduction of medical-expense risk and heterogeneous longevity into a model of savings after retirement helps match wealth by age and income quintile during retirement. The fifth force is idiosyncratic random shocks to the rate of return to wealth. This process is capable of generating a long right tail in the wealth distribution. However, the introduction of a bequest motive is found to be quantitatively more important than heterogeneous rates of return to generate the observed degree of wealth concentration. The sixth force is entrepreneurship, which is an important way to endogenize rates of return by explicitly modelling their production function. The survey shows that in a model with a simple life-cycle structure, entrepreneurship does generate a realistic level of wealth concentration.

More to the point is a paper by Heathcote and Perri (2018) as noted above. They indicate that between 2007 and 2013, U.S. households experienced a large decline in net worth. The main objective of this article is to study the macroeconomic implications of this decrease. However, they do find that during the Great Recession, wealth-poor households increased saving more than richer households, pointing towards the importance of the precautionary motive over this period. As they argue when wealth is high, the precautionary motive to save is weak but when wealth is low, the precautionary motive to save is strong. If precautionary savings played an important role during the Great Recession, then one should expect low wealth households to have reduced consumption especially sharply, since their precautionary savings should be most sensitive to increased risk. They do, in fact, find that low net worth households systematically increased savings rates by much more than high net worth households around the onset of the recession.

They find from the PSID that over the period 2006-2008, poor households reduced their consumption rate by about 4 percentage points more than rich households. One implication of these findings (which the authors do not directly specify) is that wealth volatility should be greater during economic downturns than normal times or booms, which is consistent with our findings reported below. However, as far as we are aware, there are no papers that directly investigate the issue of whether wealth volatility exceeds income volatility.

We analyse individual income and wealth volatility in PSID and SHIW across the years 2002 to 2014. We find that in both countries wealth volatility takes significantly higher values than income volatility. We then investigate the determinants of wealth volatility by exploring the dynamics of assets prices in Italy and the U.S., using data on rates of return to various components of wealth from the Jordà-Schularick-Taylor Macrohistory Database. In particular, we decompose the variance of wealth in order to disentangle the share of volatility that is due to changes in asset prices from a residual component, and find that changes in the market values of stocks and real estate assets drive most of the wealth volatility in our data. We also show that income and wealth volatility are higher in the United States and that the overall trend in both countries is increasing over time. Furthermore, we find evidence that the volatility of both income and wealth is higher during the years of the Great Recession, more so for the U.S. than for Italy. We conclude by exploring volatility in consumption and find that it predictably behaves in line with income volatility in both countries.

Our paper contributes to the literature in several ways. We are the first, to the best of our knowledge, to describe the evolution of income and wealth volatility for the same individuals over time. We do so adopting a comparative approach for two countries and a unified framework for each of the monetary variables. We further explore the channels that are likely to drive our findings and, finally, we exploit sources of heterogeneity across households in order to identify which groups are more vulnerable to income and wealth instability.

The remainder of the paper is organised as follows: Section 2 provides a review of the measures of volatility that will be used in the paper, while Section 3 describes the data. Section 4 presents results on income, wealth and consumption, and explores the role of rates of return in explaining wealth volatility. Heterogeneity analysis is conducted in Section 5. Finally, Section 6 concludes.

2. Measuring volatility

A large strand of the literature has developed sophisticated econometric methods to estimate variance components models. However, as argued by Shin and Solon (2011), these methods rely on many assumptions and results are very sensitive to parametric specifications. This is one of the reasons behind the popularity of a simpler class of descriptive measures, developed by Gottschalk and Moffitt across the last few decades (see below for the references). Relying on the literature on permanent income and permanent wealth, we can think of the logarithm of each of our monetary variables (say log of income, y_{it}) as the following:

$$y_{it} = p_i + \varepsilon_{it}$$

where p_i is a fixed permanent component with variance σ_p^2 (with mean zero and common across all individuals) and ε_{it} is a transitory component analogous to an idiosyncratic shock with variance $\sigma_{\varepsilon t}^2$. The total variance of the observed monetary variable can be decomposed into:

$$\sigma_t^2 = \sigma_p^2 + \sigma_{\varepsilon t}^2.$$

Based on this underlying model, we decompose the variance of income and wealth into a transitory and a permanent component. We here use two of the descriptive methods proposed in the literature: the first, which we call MG1, is based on Moffitt and Gottschalk (2002, 2012); the second, from here onwards MG2, was introduced by Gottschalk and Moffit (1994) and subsequently applied in Gottschalk and Moffit (2009) and Moffit and Gottschalk (2012), among others. See Chapter 6 in Jenkins (2011) for a thorough review of the econometric and descriptive methods for the estimation of the transitory variance.

The first method, MG1, offers a straightforward way of decomposing the variance. Given a long enough time interval *s* (based on data availability), it is possible to estimate the permanent component of the variance as the covariance between income (wealth) at time *t* and income (wealth) at time *t-s*. Subtracting the permanent variance to the observed variance yields an estimate of the transitory component of the variance.

On the other hand, MG2 uses a window averaging method: instead of considering a time period with respect to a number of lags, it requires the creation of a symmetric time window around a given year. Then individual averages are computed across that interval, which gives an estimate of the individual permanent income (wealth). The permanent variance is computed on the basis of deviations of the permanent income (wealth) from the sample average, while the transitory variance can be estimated as the average of individual variances of the difference between observed income (wealth) and permanent income (wealth).

We then take what Moffitt and Zhang (2018) refer to as a measure of 'gross volatility', i.e. the standard deviation of the individual differences in log income between one period and the next. Although using a measure of dispersion of income changes such as the standard deviation or the variance does not allow one to distinguish between a transitory and a permanent component, Shin and Solon (2011) argue that the standard deviation is less sensitive to calendar changes over time and that, under certain assumptions, it can provide less biased estimates of the transitory variance than MG1. Hence we conduct sensitivity analysis using the standard deviation of the two-year percentage changes in equivalent income and wealth as a measure of volatility. This measure is systematically used in the literature to analyse the dynamics and volatility individual earnings over time (see Dynan et al., 2012 for a review of the relevant literature and methodology).

3. Data description

For our empirical application, we use individual panel data from the U.S. and Italy. For the first country we rely on the Panel Study of Income Dynamics (PSID), while for Italy we use data from the Banca d'Italia's Survey on Household Income and Wealth (SHIW).

The latter began in 1965, with microdata available from 1977 onwards. It currently covers a nationally representative sample of 8,000 Italian families (about 20,000 people), with a variety of information on economic and financial behaviour of individuals, both at the individual and family level. The SHIW was a repeated cross-section until 1989, when a randomly selected sub-sample of about 4,000 previously interviewed families was selected to be part of the panel component of the study. From 1989 onwards data were collected biannually (with the exception of a three-year gap between 1995 and 1998), with the latest available wave dating 2016. The year associated with the wave in SHIW is not the year when the interview took place, but the year to which all variables refer to. For example, the 2016 wave refers to income and wealth of year 2016, but was collected in 2017.

The PSID is a longitudinal study collecting measures of income and other socio-economic information for individuals living in the U.S.. It is currently the longest running panel study in the world: starting with a nationally representative sample of 18,000 individuals surveyed in 1968, the 2017-released 40th wave of the study covers around 26,000 people, of which 3,500 from the original sample. While income in PSID is collected both at the individual and family level, a wealth supplement is only available at the family level, for years 1984, 1989, 1994, and biannually from 1999 to 2017. For this reason we restrict the analysis to years 1999 to 2017. This choice is also consistent with the SHIW, as data are available biannually from 1998 to 2016 (after a 3-years discontinuity from 1995 to 1998). Since income - in PSID refers to the calendar year before the year in which the interview took place, the time period we consider goes from 1998 to 2016, with biannual observations for both countries. Note that measures of wealth in PSID are instead observed in the interview year. See Appendix A for more information on income and wealth components in the two surveys.

In order to have a consistent time window and interview spells in the two countries, we focus on biannual observations from 1998 to 2016, with the caveat that wealth observations in the U.S. refer to the calendar year after.

Unlike in SHIW, measures of income in PSID are not net of taxes and transfers. Since 1992, PSID stopped providing estimates on federal income tax payments, making it impossible to directly derive a measure of net income from the available data for more recent years. However, the National Bureau of Economic Research made available the Internet TAXSIM program, a simulation tool aimed at calculating tax liabilities in the U.S. by assigning individuals to tax units and tax filing statuses (see Feenberg and Coutts, 1993, for a thorough description of the TAXSIM module). In particular, we rely on the method developed by Kimberlin, Kim and

Shaefer (2014) to compute federal and state income taxes between year 1999 and 2011 and extend their procedure so to include subsequent years in our sample.[1]

Most of the literature looking at earnings or income volatility using PSID focuses only on earnings of the male household head. As we are interested in individual welbeing, we prefer to keep the individual as our main unit of analysis without restricting our study to male earners only. However, both in PSID and SHIW, wealth is only available at the household level (contrary to income, which can be traced back to individuals). To reconcile an individual-based analysis with the data restrictions on wealth, we decided to attribute equivalised measures of household income and wealth to individuals older than 15. Although we consider a variety of equivalence scale parameters, we here present our analysis using the square-root equivalence scale. Appendix B discusses how the choice of the scale parameter affects the volatility measures we use throughout the paper.

As standard in the literature, we convert euros to dollars using PPP from the OECD data portal and deflate all monetary measures with 2010 constant prices. Additionally, we trim the top 1% and the bottom 1% of the observations in our samples (separately for each year in each of the two countries). We perform our analysis using a logarithmic transformation of equivalised income and an inverse hyperbolic sine transformation of equivalised wealth. The latter allows us to work with negative values without dropping them from the dataset, as would happen with a logarithmic transformation. We are therefore able to take an unrestricted sample for wealth, while for income we drop negative values and attribute the value 1 to zeros. Note that in our estimation sample, after trimming, we only have eight individuals in the U.S. with negative income and none in Italy. As for the zeroes, to which we attribute value 1, we have 414 cases in the U.S. (less than 0.5% of the American estimation sample) and again zero for Italy.

[1] The process is straightforward, since Federal laws from 1960 to 2023 and State laws from 1977 to 2016 are already coded within the program.

For MG1 we use 6-years lags to compute the permanent and transitory variance of income and wealth, whereas for MG2 we use time window averaging 5 years.[2]

Because of the longitudinal nature of the measures described above, we further restrict the sample to individuals who are observed in at least two waves before and one wave after the current interview. The final estimation sample spans from year 2002 to 2012, retrospectively and prospectively using information collected in years 1998, 2000, and 2014. It covers 11,458 individuals from Italy and 20,975 Americans, with non-missing information on income and wealth for at least three consecutive periods. Table 1 summarises the general characteristics of the estimation sample for the two countries.

4. Results

4.1 Income and Wealth

We here look at the evolution of the trends in the permanent and transitory component of the variance of income and wealth, as well as the standard deviation of individual changes from one period to the next.

Figure 1 shows the evolution of the two descriptive Moffitt and Gottschalk variance decomposition methods (MG1 and MG2) for incomes in the U.S. and in Italy. For each of the methods used, the variance of income is decomposed into a transitory and into a permanent component, the sum of which gives the total variance. The two methods seem to describe similarly the evolution of the permanent component of income in both countries, while the same cannot be said for the transitory component. The latter appears to be less smooth when using MG1 – the more so for the U.S.. Regardless of the method used, Figure 1 shows that income volatility has been increasing since 2006, mostly due to increases in its transitory component, more steeply for the U.S. than for Italy. In the latter country, in fact, income volatility appears to be at most half of the U.S. levels.

[2] We also use a 9-year centered window as a robustness check and find that results are qualitatively similar to the ones derived from the 5-year window MG2.

To our knowledge, there are no other papers applying MG1 and MG2 to income data after the mid-2000s to which we can compare our results. Moffitt and Gottschalk (2012) use MG1 and MG2 to decompose the earnings variance of males aged 30 to 39, with PSID data, but their series ends in 2004, the period after ours begins. Their estimates of the transitory variance for the latest years in their sample have a magnitude of around 0.2, about half of the effect we find at the beginning of our series. The trend in the transitory component of MG1 also seems to mirror that in income inequality for the U.S., with a big jump over the Great Recession from 2006 to 2009, an abatement from 2009 to 2012, and then a strong upward trend from 2012 to 2015 (see Wolff, 2017, for income inequality trends based on the Survey of Consumer Finances). The permanent component of MG1 shows a similar pattern over time, though with smaller slopes (more attenuated changes). Both the permanent and transitory components of MG2 show a more or less continuous increase over time. When it comes to the Italian case, the trends in both MG1 and MG2 follow more of a U-shaped pattern, slowly increasing around the Great Recession. With regard to the magnitude of income volatility in Italy, in the early 2000s, we find our transitory income variance estimates to be in line with the estimates size of Diaz-Serrano (2005). The overall variance of log income, i.e. the sum of the permanent and transitory component of the MG1 variance, appears to be slightly lower than the figure of 0.45 found by Jappelli and Pistaferri (2010) using SHIW between 1995 and 2005. However, with respect to these authors, our sample is selected differently (e.g. we do not exclude retirees, whose stable pension income might partly explain our lower figures), and we use net equivalised income instead of earnings.

Figure 2 mirrors Figure 1, describing the evolution of wealth volatility in Italy and the U.S.. In both countries we can see that wealth volatility seems to have increased more steeply in concurrence of the Great Recession, more so in the U.S. than in Italy. Although, to the best of our knowledge, no other paper applies MG1 and MG2 to wealth, we can still draw a parallel between the evolution of the variance of wealth and wealth inequality in the U.S. and in Italy. Wealth inequality in the U.S. was flat from 2004 to 2007, spiked upward from 2007 to 2010, and then rose modestly after that (see Wolff, 2017). Here the transitory component of MG1 tracks well with this pattern from 2006 to 2012 but then shows a decline from 2012 to 2014. In contrast, the permanent component of MG1 as well as both the permanent and transitory components of MG2 shows a more or less continuous rise over the whole period. As for Italy, Dagnes et al. (2018) find a modest decline in wealth inequality between 2000 and 2004, followed by a steep upward trend peaking in 2012 and a sharp decline in 2014. These movements appear to be mirrored by both the permanent and transitory MG1 components of the variance of wealth in Italy, while the MG2 components show a flatter trend.

Two remarks can be made when comparing Figure 1 and Figure 2. First, wealth volatility appears to be strikingly higher than income volatility, irrespectively of the time period or the country considered. This is true not only for Moffitt and Gottschalk's descriptive measures, but also for the standard deviation of the two-year percent change in income and wealth (see Figure C1 in Appendix C). The second remark is a methodological one: consistent with Jenkins (2011), it appears that MG1 systematically overestimates the magnitude of the transitory component of the variances of both income and wealth with respect to MG2, whereas the contribution of the permanent component of the variances is robustly estimated across the two methods.

So far, our results suggest that wealth is more volatile than income, at least in the countries and years considered and the trend is increasing over time; in addition, both income and wealth volatility are much higher in the U.S. than in Italy.

4.2 Consumption

We now extend this exercise to include consumption volatility. The definition of consumption is very different in the two datasets undermining the comparability of the results by country. Still, we decided to report our findings and maximize the use of the available information. We did our best to harmonize the variables with only partial success. Similarly to the analysis for income and wealth volatility, we here attribute equivalent household consumption to each individual.

In the SHIW, there are already variables coded as "durable consumption" (DC) and "non-durable consumption" (NDC). We have to use them as they are, since it's not possible to break them down into their components in the dataset. In particular, DC is the total value of cars or other vehicles bought in the last calendar year, net of the value of cars and vehicles sold; furniture, furnishings, household appliances, sundry equipment. NDC is the value of food eaten at home and outside, utilities, holidays, clothing, education, leisure, medical expenses, rent.

PSID is more focused on expenditure rather than on consumption. We tried as much as possible to apply the SHIW definitions and arrive to comparable DC and NDC values. For DC we built a measure of the value of vehicles/cars owned net of vehicles/cars sold. Questions on furniture and household appliances were introduced only in 2005. For NDC we included food eaten at home and outside, utilities, repairs and maintenance of house and cars, transportation, holidays, clothing, education, leisure, medical expenses, childcare, rent. PSID collects information on insurance expenses (on house and vehicles), loans and car leases. We decided to neglect this since there is no equivalent in SHIW.

Following the literature on consumption inequality (see Jappelli and Pistaferri, 2010), we expect consumption volatility to be lower than income volatility: while the latter is subject to both transitory and permanent shocks, the former tends to be more stable, as transitory shocks can be typically smoothed out through the credit market, dissaving, and insurance to maintain a stable living standard. As consumption is theoretically expected to mostly reflect permanent shocks, we use the same variance decompositions methods used in the figures above to test empirically whether consumption volatility is mostly driven by its permanent component. Figure 3 shows results using MG2 with a 5-year moving average window (the other methods yield qualitatively and quantitatively similar results and the results are available upon request). The figure shows that, as predicted, when it comes to non-durable consumption, the permanent component of consumption volatility is higher than the transitory one in both countries. Looking at consumption volatility of durable goods, instead, we find the opposite results. This is still quite reasonable, as durable goods can be seen as less essential and easier to renounce in case of adverse economic conditions. What is more surprising is the net effect on total consumption volatility: while in Italy the narrative of non-durable goods seem to prevail, in the U.S. the transitory component of consumption volatility matters the most.

4.3 The Effects of the rate of return

On the surface, it seems surprising that wealth volatility is so much greater than income and consumption volatility, at least for the U.S.. The reason is that an individual's wealth in year t depends directly on the person's wealth in year t-1. The actual equation (for individual i) is:

$$W_{it} = W_{i(t-1)} + r_{it}W_{i(t-1)} + s_{it}Y_{it} + G_{it}.$$

where W_{it} is the net worth at time t, r is the rate of return on wealth, Y_{it} is income, s represents the savings rate out of income Y_{it}, and G_{it} is the net inheritances and gifts received. Changes in r, s, Y_{it}, or G_{it} could lead to volatility in wealth over time. However, it is unlikely that s or G_{it} varies too much over time (G_{it}, in any case, is relatively small). Y_{it}, on the other hand, does show some volatility over time, as is evident in Figure 5, though it is smaller than that in W_{it}. Perhaps, the most volatile component is the rate of return r. The rate of return faced by an individual over time depends on both the rate of return for individual assets and the portfolio composition of assets. The latter is relatively stable over time while rates of return on individual assets do show a great deal of variation (see Table C1).

To test whether the changes in asset prices do actually explain a significant portion of wealth volatility, we use rates of return for equity and housing to simulate how these individual wealth components would evolve if they perfectly followed the market rates of return of the antecedent period. In order to do so we use country-year data for Italy and the U.S. from the Jordà-Schularick-Taylor Macrohistory Database,[3] which collects a wide range of macroeconomic variables capturing, among others, asset price dynamics for 17 developed economies between years 1870 to 2016. We build two-year real return rates based on the annual nominal rates in the database and use them to compute the "explained" part of real estate and financial equity. This allows us to compute an individual "residual" component based on the difference between the actual value of real estate (equity), as reported in PSID and SHIW, and the explained value of real estate (equity), based on asset price changes. The decomposition of the levels of housing and equity into an explained and a residual component for the U.S. and Italy is illustrated respectively in Figures C2 and C3 of Appendix C. The figures show that housing seems to be

[3] Accessed on July 23rd 2019.

very closely predicted by asset price changes, while changes in equity from year to year are not explained quite as accurately. This is more so for Italy, partly because the only available measure of equity in SHIW also includes other financial instruments (such as bills and bonds) which are impossible to disentangle from financial equity alone.

We then test our hypothesis that wealth volatility is in great part driven by the volatility of returns. Based on the aforementioned decomposition, we assess the contribution of each component (i.e. explained and residual) to the yearly variances of equity and real estate. We do so by following Shorrocks' (1982) decomposition of the variance of income into the contribution of its factor components. Figures 4 and 5 illustrate the results of this exercise. In both countries, asset price changes not only fully explain the variance of the value of real estate, but they tend to systematically overestimate it, such that the residual component of the variance is negative for almost all years. This appears to hold also for equity, although the relationship is less stabile across years, especially for Italy (probably due to the measurement issue mentioned in the paragraph above). Furthermore, both in the U.S. and in Italy (albeit in the latter only for housing), the portion of the variance explained by asset price changes tends to reflect more closely the actual variance during the Great Recession with respect to other years.

5. Heterogeneity analysis

In this section we analyze whether our results on income and wealth volatility are driven by particular groups of individuals in our samples. In order to do so, we use the transitory component of the variance derived from the MG1 method. This can in fact be interpreted not only as the difference between the cross-sectional variance of income and the covariance of current income and one of its past levels, but also as the covariance between current income and the difference between current income and one of its past levels (the same holds for wealth). Put more simply,

$$\sigma_{\varepsilon t}^2 = Var(y_t) - Cov(y_t, y_{t-s}) = Cov(y_t, y_t^*)$$

Where $\sigma_{\varepsilon t}^2$ is the MG1 transitory component of the variance and $y_t^* := y_t - y_{t-s},\ s < t$.

In order to assess the contribution of different groups of individuals to the transitory component of the variances of income and wealth, we decompose the latter by population sub-groups. Let $G_1, G_2, \ldots, G_k$ be k groups such that every individual in a population of size N belongs to one (and only one) of the groups, with $k \leq N$. Let n_j be the size of group G_j and $\pi_j := \frac{n_j}{N}$ the corresponding population share. It is straightforward then to decompose the covariance between y_t and y_t^* as follows:

$$Cov(y_t, y_t^*) := \frac{1}{N}\sum_{i=1}^{N}(y_{it} - \bar{y}_t)(y_{it}^* - \bar{y}_t^*) = \sum_{j=1}^{k}\pi_j\left(\frac{1}{n_j}\sum_{i \in G_j}(y_{it} - \bar{y}_t)(y_{it}^* - \bar{y}_t^*)\right)$$

Where $\bar{y}_t$ and $\bar{y}_t^*$ are the population averages of y_t and y_t^* respectively. We apply this decomposition to households in our sample on the basis of available characteristics of the household itself and household heads. In particular, we use household head's relationship status (single or in a cohabiting relationship), gender, age, education, and age. In the U.S. we are also able to observe the racial group of the household head. We further decompose volatility on the basis of household size.

Results are illustrated in Table 2. For each of the two countries, the table reports the percentage contribution of each sub-group to the overall volatility of income and wealth, as well as the number of households in each sub-group.[4] When it comes to relationship status, cohabitation seems to have an insulating effect against income and wealth volatility in the U.S., while the opposite is true for Italy. Differences between the two countries appear also when looking at age of household head: while the share of income and wealth volatility is the highest for young individuals in the U.S., in Italy it is middle-aged household heads who appear to be the most vulnerable to income and wealth volatility. Furthermore, individuals in retirement age in the U.S. do not seem to account for a large share of volatility, which is not the case in Italy – especially for wealth. Female headed households are less subject to wealth volatility with respect to male headed and having a graduate or post-graduate degree also seems to have a

[4] Here the overall volatility of income and wealth is computed as the MG1 transitory component of the variance of income and wealth at the household level over the years 2002-2014. Volatility levels for the two countries are reported in the last row of Table 2.

dampening effect on both income and wealth volatility. Finally, in the U.S. most of income volatility can be attributed to households where the head is African-American.

Heterogeneity results shown in Table 2 are robust to the use of other measures of volatility, such as the variance of the two-year difference in the natural logarithm of income or in the hyperbolic sine transformation of wealth. The reason we use the variance as a robustness check instead of the standard deviation is that the former is sub-group decomposable – what we need in order to disentangle the contribution of different groups of individuals to the sample volatility of income and wealth. Results for heterogeneity analysis using this other measure of volatility are available upon request.

6. Conclusions

In this paper we look at the recent trends in income, wealth, and consumption volatility in Italy and the U.S.. Income volatility is systematically lower than wealth volatility in both countries. All measures of income and wealth volatility appear to increase in the aftermath of the financial crisis, with wealth being the most affected, and their levels are always higher in the U.S. than in Italy. In particular, income volatility in Italy reaches at most half of the U.S. levels: while partly driven by higher earning inequality in the U.S., this result could also suggest that the system of tax and transfers in Italy is more efficient in protecting individuals against income shocks. Consistently with the literature, we also find that consumption volatility is lower than income volatility and substantially driven by permanent changes in consumption patterns, although the volatility of durable consumption shows a larger sensitivity to transitory fluctuations rather than permanent ones. We explain our findings on wealth volatility by looking at how changes in asset prices predict the evolution of individual wealth in our sample. We find that most of the fluctuations in housing and equity can be explained by changes in market return rates of these assets.

Our results show that individual wealth in Italy and the U.S. is highly sensitive to year-to-year fluctuations, largely more so than income. If wealth acts as a buffer to ensure consumption smoothing over time, protecting individuals against income shocks, then our results are indeed worrisome – especially in the light of the increasing trend in income volatility. While in this paper we offer an explanation based on changes in the price of real estate assets and stocks, other concurrent phenomena are likely to be in place as well. Conley and Glauber (2008) argue that a reason behind the increased wealth volatility in the U.S. could come from the liberalization of credit laws in 1978. In fact, between that period and 2004, there was an over 400 percent increase in personal bankruptcy filings in the U.S., most of which were due to unexpected medical expenses – with individuals covered by medical insurance being affected as well. The authors argue that other cases were potentially likely to be triggered by trends in demographic transition, such as increases in family dissolutions. We hope that this paper will contribute to the debate on income and wealth volatility and that it will stimulate further research on their interplay, as well as the mechanisms driving these two forces.

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Tables and Figures

Table 1: Descriptive Statistics for the Estimation Sample

Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Italy					
Income	32,804	26,639	13,855	1	128,601
Wealth	32,804	194,492	200,362	-6,800	2,250,115
Non-Durable Consumption	32,804	11,779	6,718	719	115,358
Durable Consumption	32,804	1,253	3,537	-20,578	75,607
Assets	32,804	185,571	192,404	0	2,017,615
Year	32,804	2008	3.824	2002	2014
Age	32,804	52	19.023	15	100
Female	32,804	0.52	0.500	0	1
Education	32,804	3.17	0.999	1	6
Household size	32,804	3.04	1.244	1	12
Single woman	32,804	0.15	0.354	0	1
Single man	32,804	0.06	0.238	0	1
U.S.					
Income	99,413	34,280	23,584	1	24,1567
Wealth	99,413	105,206	226,301	-130,000	3,345,062
Non-Durable Consumption	99,413	9,487	8,726	-255	749,833
Durable Consumption	87,455	29,525	126,056	-26,946	2,453,878
Assets	99,413	62,050	129,874	-329,156	2,758,257
Year	99,413	2008	3.928	2002	2014
Age	99,413	41	17.417	15	101
Female	99,413	0.54	0.499	0	1
Education	91,148	4.11	0.860	1	6
Household size	99,413	3.07	1.563	1	14
Single woman	99,413	0.26	0.437	0	1
Single man	99,413	0.10	0.298	0	1
Race head					
White	51,141	0.58	0.494	0	1
Black	51,141	0.36	0.481	0	1
Other	51,141	0.05	0.221	0	1
Race spouse					
White	25,901	0.71	0.454	0	1
Black	25,901	0.21	0.410	0	1
Other	25,901	0.07	0.248	0	1

Note: all monetary mesures are equivalised and expressed in 2010 constant dollars.

Table 2: Percent contribution to volatility, by group

	U.S.			Italy		
	Income	Wealth	*N*	Income	Wealth	*N*
Status						
Single	81.6	56.0	25,358	33.6	43.7	4,850
Cohabiting	18.4	44.0	25,783	66.4	56.3	10,003
Gender						
Women	47.0	36.2	17,104	51.9	36.2	5,069
Men	53.0	63.8	34,037	48.1	63.8	9,784
Age group						
15-34	42.5	47.5	15,617	11.7	4.3	351
35-44	16.9	21.0	10,366	24.9	16.8	1,735
45-54	21.1	17.0	10,685	37.8	30.8	3,119
55-64	11.0	9.6	7,730	13.0	21.4	3,492
65+	8.4	4.8	6,743	12.6	26.6	6,156
Education (highest degree)						
None	0.8	0.5	348	1.6	4.7	679
Primary	2.8	1.4	804	19.3	29.0	4,043
Lower secondary	24.9	7.6	5,408	54.2	42.1	5,093
Upper secondary	59.3	63.4	30,842	16.4	20.1	3,646
Graduate	7.6	17.2	7,331	8.1	4.0	1,301
Post-graduate	4.7	9.9	4,694	0.3	0.0	91
Household size						
One	51.9	30.1	13,423	27.3	27.0	3,201
Two	20.4	25.4	15,287	13.7	20.0	4,754
Three	11.4	18.5	9,067	19.8	18.7	3,121
Four or more	16.3	26.0	13,364	39.2	34.2	3,777
Race						
White	33.3	55.0	29,473	-	-	-
Black	62.7	39.5	18,619	-	-	-
Other	4.1	5.5	2,635	-	-	-
Total	*0.93*	*43.42*	*51,141*	*0.18*	*4.63*	*14,853*

Note: numbers in the columns “Income” and “Wealth” indicate percentages. Each percentage expresses the relative contribution of each group to the overall income (wealth) volatility and is derived from the sub-group decomposition of the MG1 transitory component of the variance of income (wealth). Individual characteristics (e.g. age, gender) refer to household heads. The row *Total* reports total income and wealth volatility in the U.S. and in Italy, as well as the size of the sample of households in each country.

Figure 1: Trends in Transitory and Permanent Income Variance

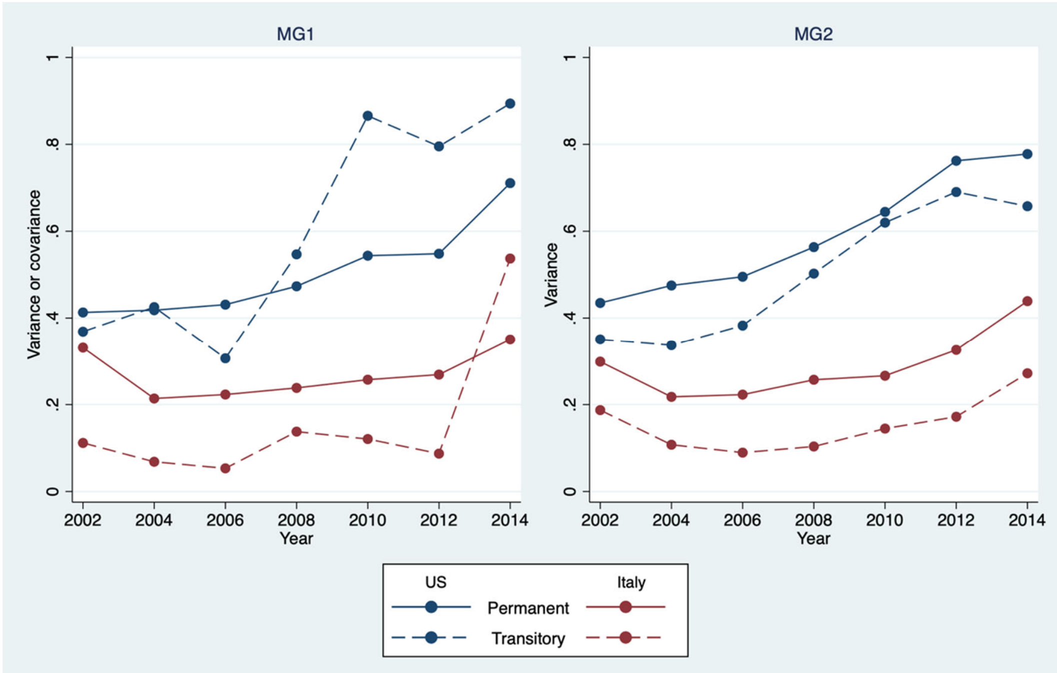


Figure 2: Trends in Transitory and Permanent Wealth Variance

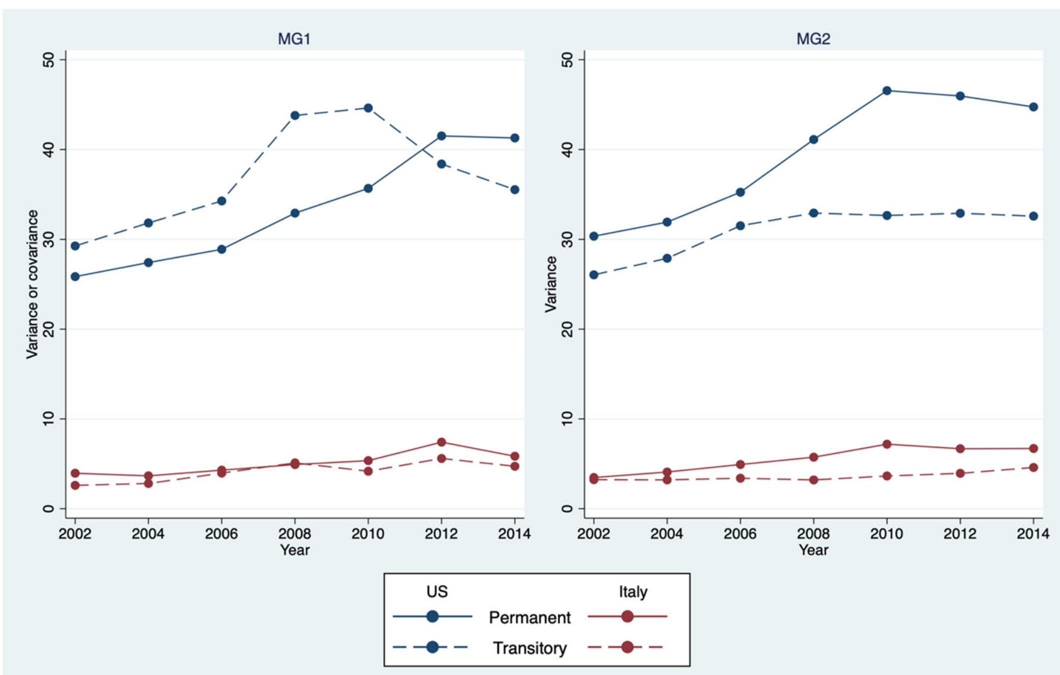


Figure 3: Trends in Consumption Variance

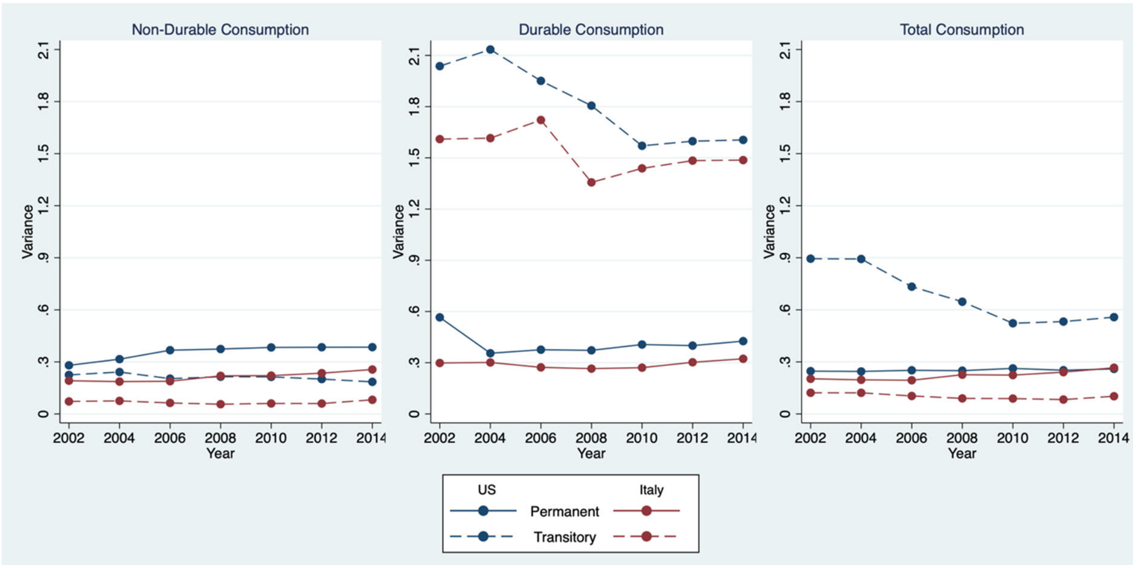


Figure 4: Variance Decomposition into its Explained and Residual Components (PSID)

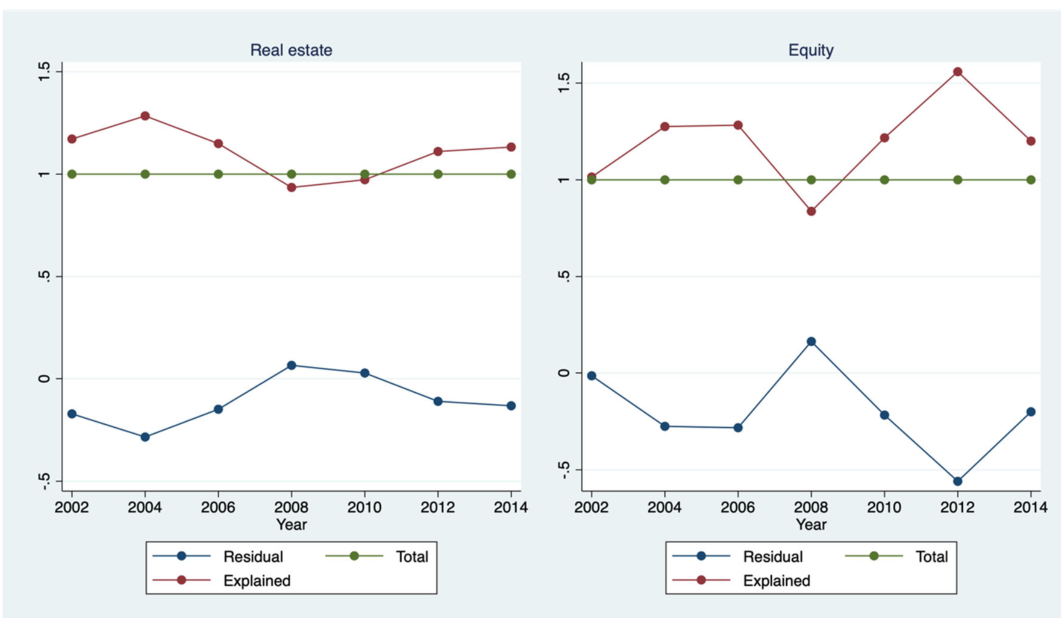
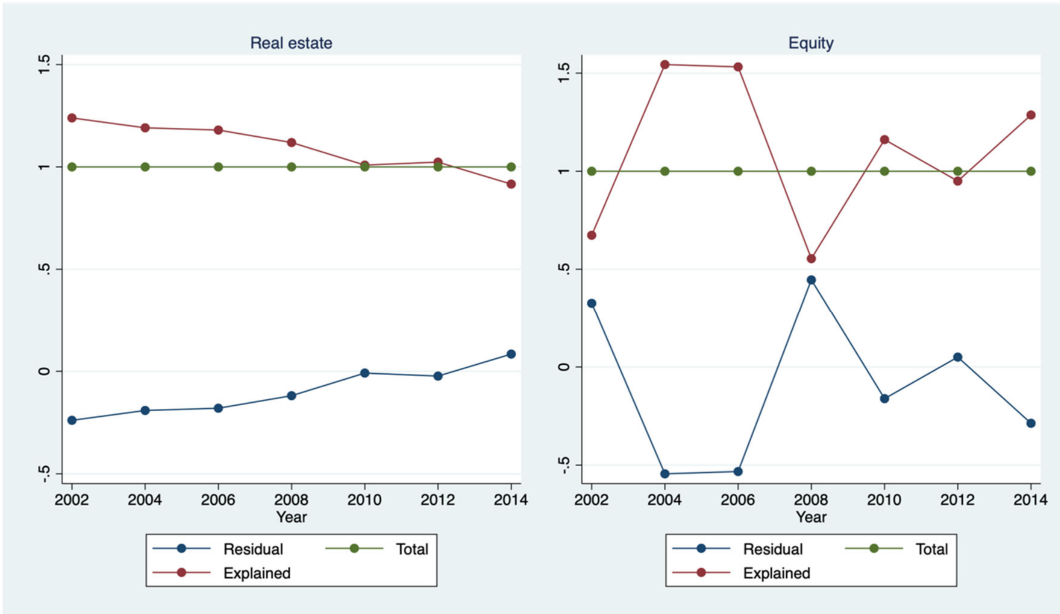


Figure 5: Variance Decomposition into its Explained and Residual Components (SHIW)



Appendix A: Income and Wealth components in PSID and SHIW

A.1 Income components

In order to account for the economies of scale deriving household members sharing economic resources, we here attribute each individual a measure of equivalised income, using a square-root equivalence scale.

In SHIW, family income is the sum of each household member's net disposable income. This can be derived as the sum of net labour income, transfer income, business and self-employment income, and asset income. Labour income includes both net salaries or wages and other forms of monetary compensation, as well as in-kind benefits (e.g. company car).[5] Transfer income includes pensions and other state transfers; from 1998 this category further includes transfers to and from non-cohabiting relatives or friends). Business and self-employment income is the sum of profits, dividends, and self-employed income, net of capital depreciation. Finally, asset income includes income sources deriving from real estate assets (i.e. rents) and financial assets (i.e. interests).

Similarly, family income in PSID is measured as the sum of each household member's taxable income, transfer income, and social security income. Taxable income is any income deriving from assets (i.e. interest, dividends, trust funds, rent), earnings (e.g. wage or salary, overtime, tips, commissions), and net profit from farm or business. Transfer income encompasses all transfers received by the family members, including pensions and annuity income. Note that the latter refers to defined contribution pension plans, such as the 401(k), and not to other forms of private annuities or IRAs, which are instead included in the computation of wealth. Missing values for all income components are imputed using overall median substitution by income source and recipient (for further details on the imputation method refer to PSID, 2019).

Unlike in SHIW, however, labour income in PSID is measured before taxes. In order to ensure consistency between our measures of income across the two countries, we compute a measure

[5] Note that housing is not included as a form of in-kind benefit.

of net family income in PSID by estimating federal and state income taxes with the TAXSIM module (Feenberg and Coutts, 1993).

A.2 Wealth components

Both in PSID and in SHIW wealth is only available at the family level, which makes equivalisation necessary in order to perform an individual-level analysis.

In SHIW, family wealth is computed as the sum of real and financial assets, net of financial liabilities. Real assets include houses, businesses, and land and buildings, as well as valuable objects (e.g. jewels, furniture). Financial assets are the sum of the value of checking and saving accounts; bonds; stocks, funds, and other financial instruments; credits towards relatives or friends. Lastly, debts towards banks or financial corporations, commercial debts, and debts towards other families make up financial liabilities.

The PSID provides two aggregate measure of family wealth, one without and the other with housing equity. The latter is the sum of the values of seven asset types (farms and businesses; checking and saving accounts; other real estate; stocks; vehicles; other assets, e.g. bonds, funds, valuable collections; private annuities or IRAs), net of debt value (credit card debt; student loans; debt deriving from medical or legal expenses; loans from relatives), plus the value of home equity (measured as the self-assessed market value of the house, net of self-reported mortgage debt).

Most wealth components overlap across the two countries. The main discrepancy is given by the attribution of vehicles: as these are not included in the definition of wealth in SHIW (figuring instead as durable consumption), we here use a measure of wealth in PSID which is net of the value of vehicles.

Appendix B: Volatility and the Equivalence Scale Parameter

We here look at the sensitivity of our volatility measures to the choice of the equivalisation parameter α.[6] In Figures B1 and B2 we plot the relationship between income and wealth volatility and the parameter for the years in which all of our volatility measures were available, namely 2004, 2006, 2008, and 2010. Depending on the measure used and on the year considered, we find either a U-shaped or a negative relationship between income volatility and α. This is consistent with the considerations on income inequality and the equivalence scale parameter by Cowell and Mercader-Prats (1999), who find a similar U-shaped relationship using Spanish data. The measure that seems to be the most sensitive to the choice of α, especially in the U.S., is the transitory component of the income variance derived with the MG1 method. We find a flatter relationship instead for other measures, especially the standard deviation.

Figure B2 shows a linear relationship (with negative slope) between wealth volatility and the equivalisation parameter. This comes as no surprise, since by construction there is an approximately linear relationship between the inverse hyperbolic sine transformation we used to rescale equivalised household wealth and the equivalisation parameter. Again, the measure that appears to be less sensitive to the choice of α is the standard deviation of the individual percentage changes in wealth between two consecutive periods (SD in the Figures).

[6] The parametric equivalence scale we use divides household income (wealth) by the number of household members raised to the parameter α, $\alpha \in [0,1]$.

Figure B1: Income volatility and the Equivalence Scale parameter

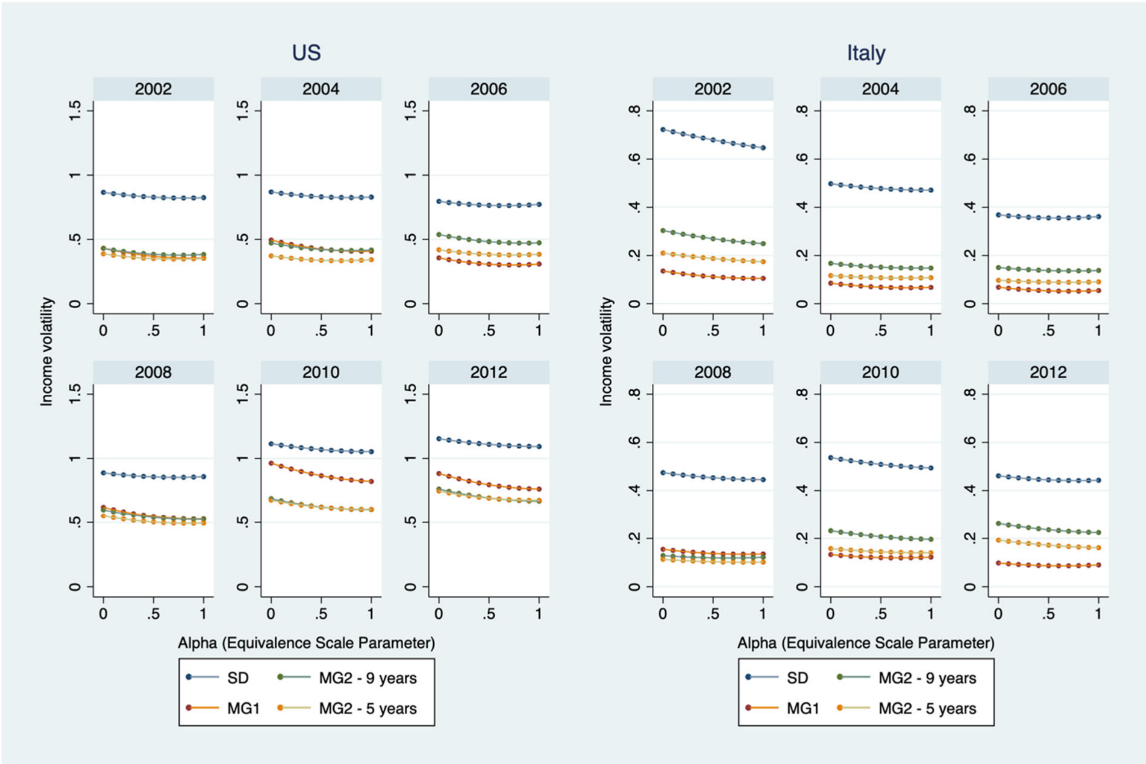
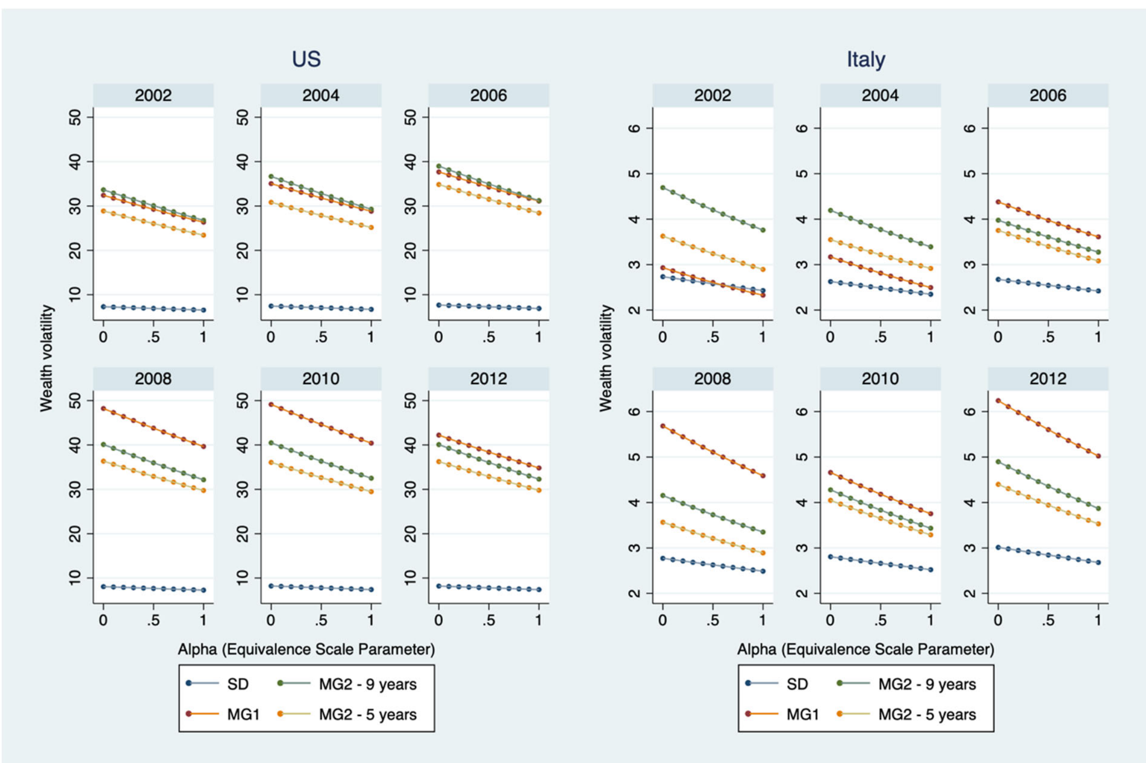


Figure B2: Wealth volatility and the Equivalence Scale parameter



Appendix C: Other Figures and Tables

Figure C1: Income and Wealth volatility in Italy and the U.S.

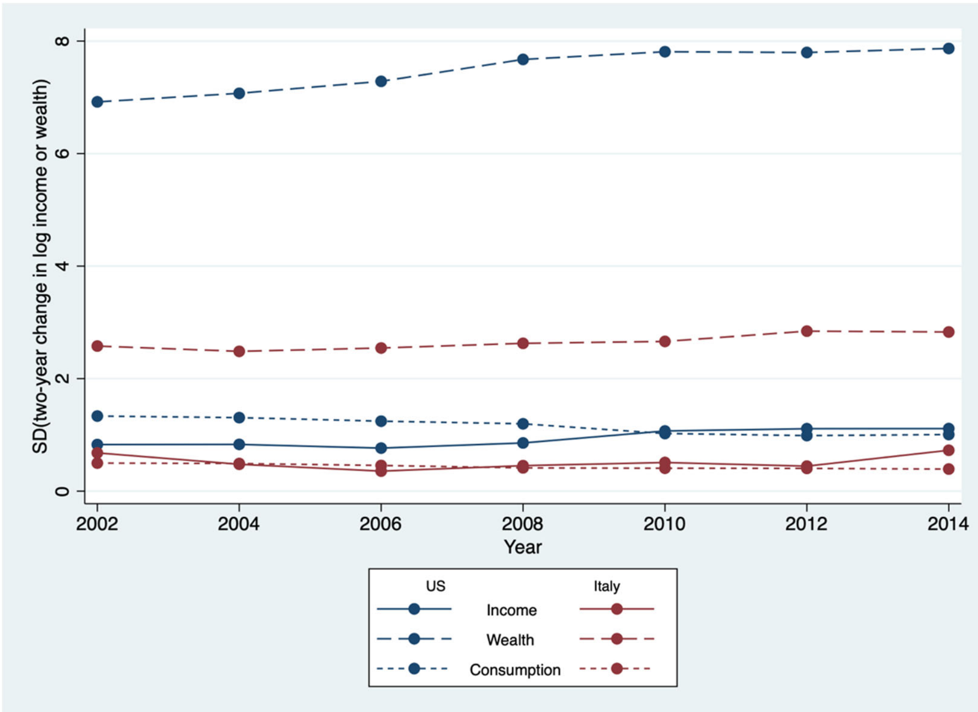


Figure C2: Residual and Explained levels of Wealth in PSID, by wealth type

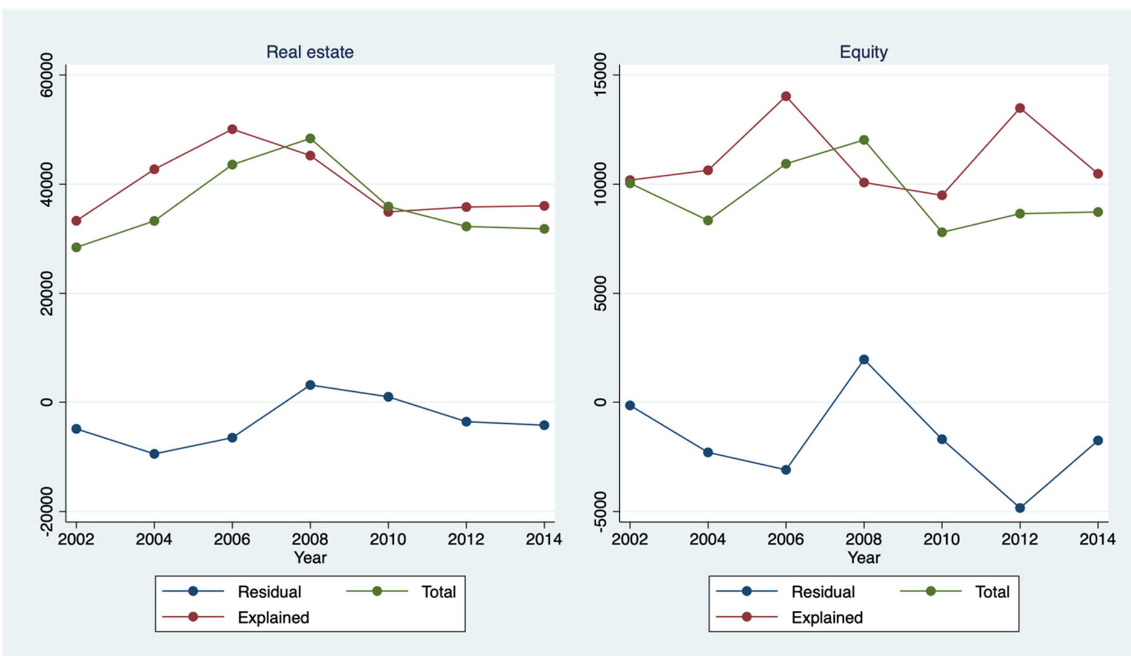


Figure C3: Residual and Explained levels of Wealth in SHIW, by wealth type

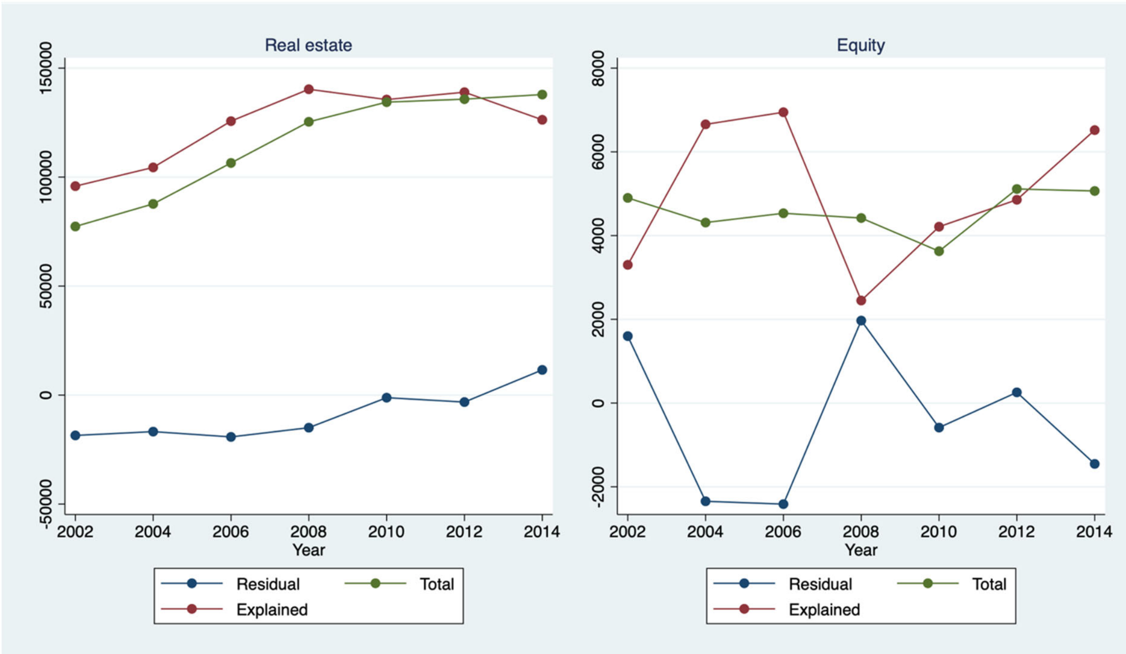


Table C1: Percent changes in asset prices over time

Time span:	2002-2006	2006-2008	2008-2010	2010-2014
U.S.				
Equity	62.8	-14.8	17.9	92.3
Housing	46.9	-3.3	-6.2	29.4
Italy				
Equity	137.5	-44.8	14.8	21.5
Housing	41.2	11.8	-0.5	-6.9

Note: return rates used to compute the percentage changes in the table are adjusted for inflation.