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by

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Wealth Accumulation of US Households: What do we learn from the SIPP data ?

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Abstract

In this paper, I estimate, for US households, age-wealth profiles which allow for cohort effects. I use these to reexamine one of the central empirical propositions simple life-cycle models: dissaving after retirement. The analysis employs a data set which has not been previously examined in this way: the Survey of Income and Program Participation (SIPP). The main regression results suggest that elderly households do not dissave after retirement. However, an examination of the distribution of wealth at retirement reveals that most households have accumulated very little wealth from which to dissave. Given that about 40% of households are not covered by any occupational pension, social security payments are the main source retirement income for a large number of households. Even more than the absence of post-retirement dissaving, it is this overall lack of pre-retirement saving which seems to contradict standard life-cycle models.

Keywords: Wealth Accumulation, Life Cycle Models, Cohort Analysis.
JEL classification: D91, C23

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1 Introduction

The aging of the population in Europe and North America, coupled with an increasing life expectancy, has recently generated a renewed interest among academics and policy makers in understanding how households allocate wealth over their lifetime, particularly in older age. The dramatic change in the age distribution of the population in the western world is threatening the generosity of the traditional state run unfunded pension systems which have been so successful in sharply reducing poverty rates among the elderly. An alternative to pay-as-you-go systems, which seems to appeal to many governments, is a system which relies on individuals' own contributions. Regardless of other considerations (such as intergenerational or intragenerational equity), an assessment of such proposals requires that we know whether individuals (households) are far-sighted enough to plan effectively for their own retirement. A simple empirical test consists of studying the age-wealth relationship among households. One implication of simple life-cycle models is that a forward looking individual should save during his active life and smoothly run down assets upon retirement. Therefore, the resulting age-wealth profile should display a "hump" around the retirement age.

Numerous studies have focussed on how wealth accumulation (or saving) varies over the life-cycle. However a consensus supporting or rejecting this basic prediction of the life-cycle model has yet to emerge. The contribution of this paper is to re-visit this issue using a time series of independent cross-sections from the Survey of Income and Program Participation (SIPP).

Previous papers that have analyzed the age-wealth profile of American Households using the SIPP data include Land and Russell (1996), Attanasio and Hoynes

(1995) and Venti and Wise(1996)[1]. However, the first two studies disregarded potential cohort effects which are known to impart important biases in the inferred age-profile. Venti and Wise (1996) do account for potential heterogeneity across cohorts, however they specifically focus their analysis on the changing pattern of individual retirement saving vehicles such investment retirement accounts (IRAs) and 401Ks accounts.

The SIPP data is not usually thought of as the best source of information for studying trends in wealth holding in the United States. Data from the Panel Survey of Income Dynamic (PSID) and the Survey of Consumer Finance (SCF) are seen as more. SCF inarguably provides a more comprehensive picture of the wealth distribution of American households than PSID or SIPP (see Wolf (1999) or Juster Smith and Stafford (1999)). However, inferring the wealth accumulation of average households from this data source may be statistically cumbersome as the SCF oversamples the wealthiest families. A method to deal with oversampling of the richest households in the SCF using cohort analysis is proposed by Sabelhaus and Pence (1999).

As it is also possible to disentangle age and cohort effects using panel data, the PSID offers an alternative to stacked-cross-sections from a survey like the SCF. However, panel surveys (especially long panels) are subject to possibly severe attrition bias complicating the econometric analysis.

Despite the data quality issue, the SIPP does have the advantage of being representative of the US population. Thus, it is an ideal data set to study the

[1]For fairness, we must mention that analyzing the presence of cohort effects was not the concern of both papers. Nevertheless Land and Russel explicitely make the a priori assumption of no-cohort effects which is clearly unsatisfactory. Attanasio and Hoynes paper introduces a method to correct for mortality differential bias which is an other source of bias which should not be ignored when making inference on households wealth accumulation.

wealth accumulation pattern of the average American family. It is interesting to note that the wealth information in the SCF, SIPP and PSID was collected at similar period in time (mid '80s to mid '90s) so that the current study offers the possibility of an interesting comparison with studies based on those other datasets.[2]

To preview my results, once I control for cohort effects I find no evidence that households decumulate wealth upon retirement. My results suggest that these cohort effects can only be partly explained by productivity growth. This contrast with the results for Italian households reported by Jappelli (1999).[3] Like Jappelli, I find that education plays an important role in explaining differences in wealth accumulation across households. Other basic demographic variables (such as ethnicity and gender of the household head) also help to explain the heterogeneity in the saving behaviour of American households. This is apparent from both a simple inspection of the data and from regression analysis. I also confirm the overall lack of private saving by the majority of American households. This low level of wealth accumulation may ultimately be more relevant to policy makers than the failure of American households to decumulate wealth upon retirement. Whether American households are undersaving remains an open question. Recent studies[4] argue that levels of saving, necessary to maintain households' pre-retirement standard of living, are found once social security wealth and private pension wealth are included the definition of wealth. Other studies, using

[2] In a recent paper, Juster, Smith and Stafford (1999) look at data quality issues comparing the PSID wealth supplement with the wealth module of SCF. A more focused comparison of the wealth data collected in the PSID with the pooled sample from the SIPP used in this paper might provide further evidence about possible data reliability issues. I leave this for future work.

[3] Who is looking at the age-wealth profile of Italian households.

[4] See Egen, Gale and Uccelo (1999), Gustman and Steinmeier (1998) among others.

the same source of data[5], have reached the opposite conclusion.

In the following section, I review our current knowledge of the potential determinants of (dis)saving behaviour of the elderly from a life-cycle perspective. In section three, I briefly review my empirical strategy and then provide a description of my data. I discuss my main findings in section five and then offer some concluding comments in section 6.

2 What have we learned from life-cycle research ?

The Modigliani and Brumberg life cycle model (1954)) (also known as the Certainty-Equivalence Model (CEQ)) provides a set of benchmark predictions of the life-cycle hypothesis. Some of the predictions are tempered in richer life cycle models, with bequest motives or precautionary savings.

In the simplest version of the model, unconstrained forward-looking agents maximize intertemporally additive quadratic preferences. These agents smooth their lifetime consumption and the latter is independent of income paths. This provides a useful framework for thinking about savings for life-cycle motives. Individuals build up savings during their high earning years to finance their needs in the later part of their lives. As a result, individual age-wealth profiles should display a "hump" occurring around retirement age. Under the implausible assumption of certain longevity, an individual should run down all her assets upon her death. An assumption usually made in these models is that productivity growth is generation specific. This implies that any productivity shocks would induce a parallel shift of the age-wealth profile without affecting its shape.

[5] Compare for instance, Gustman and Steinmeier (1998) and Lusardi (2000) using the Health Retirement Survey (HRS).

Although, this simple life-cycle model model delivers useful insights into individuals' lifetime wealth accumulation, it has a hard time explaining the patterns of wealth accumulation actually observed in the data. Empirical studies generally suggest a much slower rate of dissaving in older age than the benchmark model predicts, or indeed no dissaving at all. To explain this slow rate of dissaving later in life, a useful augmentation of the basic CEQ model is to allow for altruistic behaviour. A bequest motive is often modeled as an argument entering individual preferences to capture the trade-off between the consumption of some good and building an estate. It is reasonable to think that the elderly might reduce consumption in order to pass on an estate to their heirs. Kotlikoff and Summers (1981) argue that observed transfers of non-negligible amounts of bequeathable wealth upon death corroborates the existence of an altruistic motive. However, many argue that these intergenerational transfers are involuntary. Evidence for the latter position is found in early work of Projector et al. (1966) who reported that in the Survey of Financial Characteristics of Consumers (SFCC) only four percent of households claim to be saving with the explicit intention of leaving an estate to their heirs. Hurd (1987) suggests that comparisons of the behaviour of elderly households with and without living children should reveal the empirical importance of the bequest motive. Evidence of greater dissaving by elderly households with living children than those without living children[6] in the Retirement History Survey (RHS) data leads him to conclude that the bequest motive is not important. This apparent absence of an important altruistic motive implies that observed bequests are unintended[7].

Involuntary bequests are consistent with saving driven by a precautionary mo-

[6] The comparision of wealth change was made within wealth and annuity quartiles.

[7] However, it does not rule out the existence of bequests earlier in life.

tive[8]. Rational elderly households faced with some uncertainty (most obviously regarding longevity) and having non-quadratic preferences, will reduce their consumption to insure themselves against unforeseen contingencies. Yaari's (1965) was the first to formally model uncertain longevity. His model shows that uncertain longevity indeed reduces the rate of growth of consumption. However, he did not derive a closed form solution and thus could not assess quantitatively the impact of uncertain longevity on wealth accumulation. Such an analysis is accomplished by Davies(1989), who builds on both Yaari(1965) and Mirman (1977). Davies (1989) assumes constant relative risk aversion (CRRA) utility function with reasonable preference parameiters and uses actual earnings data and survival probabilities to simulate individual consumption plans. His simulations show an unambiguous negative impact of uncertain longevity on consumption. However, his results still suggest a steeper rate of dissaving than is typically observed in the data.

This result seems to hold for any "near the end of the life cycle" precautionary motive. For instance, Palumbo(1997) looks at the impact of uncertain medical expenses on wealth accumulation by the elderly in a model that also features uncertain longevity. He finds that the combined effects of uncertain longevity and unexpected medical expense shocks would lead elderly households to slow their dissaving even further than in the case previously examined by Davies. Insurance against unforeseen earnings shocks is an other factor that could induce precautionary savings. However, as pointed out by Lusardi and Browning (1996), earnings risks should not play a significant role in shaping the asset (dec)accumulation of the elderly as they have entered the part of their life in which the expected

[8] Assuming the individuals exhibit non quadratic preferences.

income stream can be assumed to be relatively free of risks[9].

Overall, the various extensions of the cruder model are not at odds with the basic predictions of the CEQ model. Regardless of the level of sophistication of those models, they all predict that some dissaving should take place at older ages.

3 Empirical Methodology

It is now generally accepted that to make correct inferences about households wealth accumulation, it is crucial to disentangle age effects from cohort effects. The presence of cohort effects in the data cannot be identified from a simple cross-section since each generation (cohort) is only observed once. The importance of accounting for potential cohort effects was first reported by Shorrocks (1975) who noticed that the hump-shaped profiles, sometimes found in cross-sectional surveys, were no longer observed when the age-wealth relationship of different cohorts was plotted. Cohort effects reflect the possibility that individuals belonging to different generations (cohorts) may experience different wealth paths due to changes in preferences or economic conditions. Simple life-cycle models take preferences as fixed and attributed cross cohort differences to increasing labour productivity.

Mirer (1979) was the first to formally control for inter-cohort differentials by assuming a constant (and known) rate of increase in wealth at retirement between cohorts. Relying on this strong assumption allows him to identify the pure age effect of household wealth accumulation on a simple cross-section. King and Dicks-Mireaux (1982) introduced a similar but more sophisticated approach

[9]Most elderly households rely on pension annuities (social security and defined benefit pensions), many of which are indexed to inflation and not subject to financial market volatility. However, in the future, should the share of retirement income from self directed pension plans invested in more volatile assets increase, earning risk could definitely affect asset accumulation at older ages.

using a Canadian cross-section. Maintaining the assumption that inter-cohort differentials depend only on generation specific productivity growth, they control for cohort effects by estimating the age profile implied by the (log of) wealth to permanent income ratio.Thus, pure age effects can be identified from a simple cross-section by making strong assumptions about how cohort effects affect household age-wealth profiles. However, testing the validity of these assumptions is impossible. In order to adequately address these issues, one needs to turn to either genuine panel data or time series of cross-sections (pseudo-panel data) which allows one to track cohorts over time as in Shorrocks (1975).

Time series of cross-sections are particularly well suited to the study of individual age-wealth profiles. Not only do they allow one to follow the same cohorts over time but unlike panel data, they do not suffer from attrition bias. The most simple empirical specification consists of decomposing wealth into a linear combination of functions of age and cohort. In the most unrestricted formulation the functions of age and cohorts can be expressed by a set of unrestricted age and cohort dummies (Deaton 1994, 1997). For parsimony, the age effects and the cohort effects could alternatively be specified as polynomials. To capture common unexpected macroeconomic shocks in the empirical specification, the model may be augmented by the inclusion of a set of time (year) dummies. However, because age, cohort and year effects are perfectly multicolinear, the wealth equation can no longer be identified in the presence of time effects. To overcome this identification problem, various normalizations of the time effects have been suggested in the literature. None of them is completely satisfactory. In this paper, I follow Deaton (1994) and assume that the time affects are orthogonal to a time trend. For a detailed discussion of the implications of such a normalization, see Deaton (1994, 1997) or Jappelli (1999).

4 The Data on Net Worth in SIPP

This paper exploits all the publicly available surveys of the Survey of Income Program Participation (SIPP) which include information on household wealth. These are the 1984, 1985, 1986, 1987, 1990, 1991, 1992 and 1993 surveys. Each survey is a (rotating) panel covering a period of roughly two and a half years. During this period information on respondent households is collected every four months. The data available in each panel is organized into core and topical modules. The core module questions are common to each wave while topical module questions are only asked in selected waves. Topical module data are thus often cross-sectional. Wealth variables were usually collected in the fourth and in the seventh wave of each survey and include data at both individual and household level.

Note that the *survey* years, by which the different surveys are identified (listed above) are often not the same as the year to which the collected data refers. Furthermore, since a new panel is started every twelve months (in both the 80's and the 90's) and the information on household wealth can be collected in either the fourth or seventh wave (or both), wealth information from two different survey years may actually refer to the same time period. The year to which the collected data actually refers is called the *reference* year.

At the *individual* level, components of wealth are collected in both the fourth and the seventh waves so that a (repeated short) panel can potentially be constructed (Hildebrand and Crossley (2000)). Unfortunately, individual wealth components do not allow the construction of a measure of wealth which aggregates to the measure of household wealth also available in the survey. Unlike individual wealth, information on wealth holding at the *household* level is only

longitudinal for the survey years 1984, 1985 and 1986. In all subsequent surveys, household level information is only available in one wave. As the main objective of this paper is to study the accumulation of households wealth over the life-cycle, I focus on wealth information provided at the household level and use pseudo-panel techniques. The pseudo-panel includes the third wave of the 85 panel, the fourth wave of the 84,86,87,90 and 92 panels and the seventh wave of the 91 and 93 panels. As a result, the actual (reference) years covered by the pooled sample include 84, 85, 86, 88, 91, 93, and 95 for a total time span of 11 years, as illustrated in Table 1.

The assets covered by the definition of household net worth in the SIPP include interest earning assets, stocks and mutual funds shares, real estate, own businesses and motor vehicles. The liabilities covered include debts secured by any assets, credit card or store bills, bank loans and other unsecured debts. Social security benefits, which are known to account for an important share of household wealth in older age, and private pensions are not included in the definition of household wealth in the SIPP data. This definition of wealth is similar to the one used in other surveys including the SCF and the PSID[10].

I have limited my sample to the *primary family* in each household but I did not impose any restrictions on family composition. I have eliminated 140 households who exhibited either an extremely large positive or negative wealth holding in order to minimize the influence of potential outliers. This reduces the initial sample used in the analysis to 126,834 households. When performing the cohort analysis only those households whose head was born between 1915 and 1960 and were between 30 and 80 years old were kept, further reducing the

[10] This can easily be explained by the diffculty that survey respondents would have in assessing their future pension benenfits including occupational pensions and social security annuities.

sample to 92,116 cases. The selection on year of birth is motivated by the need to define cohort sizes sufficiently large to ensure consistency of the estimates. All wealth data are expressed in 1984 constant dollars.

Finally, the distribution of wealth is usually very skewed to the left (for an illustration with the SIPP data, see Figure 1) so that a log transformation is desirable. However, such a transformation excludes all the households with negative or zero wealth holding (11.7% of the sample). In most previous work such households are excluded from the analysis, but this may lead to sample selection bias. The hyperbolic sine transformation is a more convenient alternative which does not exclude households holding zero or negative wealth[11] and I use it in this paper.

Before discussing the results of the econometric analysis, I briefly present some characteristics of the data. Table 2 presents for each survey year the percentage of households with non-positive wealth by household characteristics. In the literature, the exclusion of households with non positive wealth is sometimes justified by the assumption that they were displaying seemingly myopic behaviour[12]. In this paper, I deliberately do not exclude any households based on a priori assumptions and attempt to test basic feature of the life-cycle hypothesis on a relatively unrestricted sample. As expected, Table 2 reveals that households headed by a male are substantively less likely to hold negative or zero net worth than those households headed by a woman. Race is also an important determinant of wealth accumulation. For the sake of comparison, the last column of Table 2 reports the percentage of households headed by non-white females reporting negative or zero saving. Although much higher than for households headed by men, the percent-

[11] Burbidge, Magee and Robb (1988). See also Kapteyn, Alessie and Lusardi (1999) for a recent example on Dutch data.

[12] See King and Mireaux (1982) among others.

age of households headed by females with zero or negative wealth has sharply decreased in the most recent survey years. This decline is particularly apparent among households headed by non-white females.

In my sample, lone mothers and widows make up most of the families with non positive wealth balances. Households headed by men with non-positive wealth holding have on average more dependent children. Therefore an other possible factor explaining the absence of saving among these households may be liquidity constraints.

Table 5 presents the average net worth by decile in each reference year. I find a surprising stability in the wealth distribution across reference years with the exception of both the poorest and the richest households. The situation of the former has gradually deteriorated while the latter experienced a substantial increase in recent years. This sudden wealth increase is often attributed to the recent upward trend in the stock market[13]. In Table 6, the total net worth of different cohorts is presented by quartiles. In this descriptive analysis, cohorts are defined by the birth year interval of the head of household as defined in the first column of Table 6. The latter reveals that all cohorts have accumulated a significantly positive amount of wealth. Comparison of the level of wealth between the two eldest cohorts seems to suggest that some dissaving is taking place well after retirement age. However, as noted by Jappelli (1999), one cannot draw any conclusion regarding the life-cycle model from such tabulations. The trend reported in Table 6 reflects a mixture of age, cohort and year effects. Table 7 reports the same statistics for households' financial net wealth[14]. Comparison

[13] See Porteba (2000). I will not investigate this question further as it is not the main point of this paper.

[14] Financial net worth is defined the usual way by substracting net houseing equity from household net worth.

with Table 6 suggests that the portion of household wealth readily available for consumption is much more modest once housing equity is substracted. Moreover, financial wealth appears largely concentrated among the households in the last quartile of the distribution. Comparing the 75th percentile with the 95th percentile shows that even among these better off households the distribution remains very skewed. The difference between the two measures of wealth seems to indicate that the main asset in the portfolio of the majority of American households is their home equity. This question is investigated further in Table 8. It confirms that more than half of the portfolio of the average household comprise illiquid assets (home equity and vehicle equity). The share of housing equity seems to increase with age suggesting that most of the wealth accumulation of the average household is achieved by increasing the value of their housing equity . Overall, these findings corroborate those of previous studies[15]. Most striking is the lack of substantial accumulation of (liquid) assets by most American households leaving a non-negligeable proportion at risk of relying on social security wealth upon retirement[16]. Simulations from Egen, Gale and Uccelo (1999) suggest that this low saving target is consistent with a perfectly rational consumption plan given the existence of replacement income from social security and company sponsored pensions. Indeed, pension wealth is an additional potential source of wealth which is not captured by the measure of net worth provided in the SIPP.

The distribution of pension wealth is known to be fairly uneven across households (Porteba et al. (1999)). For instance, the 92 release of the SIPP shows that about 44% of full time workers are not enrolled in any occupational pension plan (Andrietti and Hildebrand (2000)) while about the same proportion of retirees

[15] See Wolff E. (1999) among others.

[16] See Porteba, Venti and Wise (1994) for a more detailled analysis of this particular issue using SIPP.

did not report receiving employer-provided pension income in 1991(Porteba et al. 1994). Table 9 reveals that within the 50 to 60 year old age range, one does not observe important differences in the household net worth of households who are and are not covered by occupational pension plans (at least in the first three quartiles of the wealth distribution). It is still possible that this pattern could be reconciled within an optimizing framework. For instance, low wealth households may be responding to the disincentive effects of social security and medicaid asset tests (see for example Hubbard, Skinner and Zeldes, 1995).

5 The Age-Wealth Relationship: cohort analysis

Figures 2 and 3 display the age profiles of both household total net worth and financial net worth in the pooled cross-sections. Comparing the mean and median profiles confirms the high the degree of skewness in the distribution of both measures of wealth. The skewness is even more pronounced in the distribution of financial net wealth as the average household profile and the 75th percentiles one are almost identical[17]. As in previous studies[18], the average household profile displays a hump shape around retirement age (60). However, this cross section profile in the SIPP data is not necessarlily evidence in support of the predictionsof life-cycle models as age effects are confounded with cohort effects.

To address this issue descriptively, I define nine cohorts based on the birthyear intervals (as defined in column 1 of Table 2) of the head of household. In Figure 7, I plot the mean of household total net worth of each of the nine cohorts which are observed 10 times between 1984 and 1995. This representation of the average

[17] Up to age 50, after which, interestingly, they diverge.

[18] See Attanasio and Hoynes (1995), Land and Russel (1996).

household age-wealth profiles of each cohort is useful for visualizing the decomposition between age and cohort effects. Moving along the curve representing each cohort captures the age and the time effects while the vertical shift between two cohorts measures the magnitude of cohort effects.

Figure 7 clearly reveals the existence of both age and cohort effects. The age effects implied by the profiles of each cohort are always positive including the one for the oldest cohort. Similar profiles are found when financial net wealth is considered (Figure 8). In order to capture potential heterogeneity among households, I also plot the age-wealth profile of each cohort by quartiles (Figures 9 to 11) and find no major differences in the shape of each profile.

I find positive cohort effects. The vertical shift between cohorts is smaller for more recent (younger) cohorts, suggesting that these cohort effects are declining in magnitude. One possible explanation is the economic slowdown of the mid '70s. A close examination of the age-profile implied by each cohort does not reveal any obvious effects due to common macroeconomic shocks.

The regression results presented in Tables 11, 12 and 15 confirm the main findings of the descriptive cohort analysis. I start by regressing household total net wealth (or financial net wealth) on a spline function of age and a full set of time dummies in the pooled cross-section. I compare these cross-sectional results with an alternative specification where I control for potential cohort effects using a spline function of cohort (expressed by the year of birth of the head) and impose an identification restriction on the set of time dummies[19] to get around the multicolinearity problem. The estimation results for net wealth are reported in columns 1 and 3 of table 11 (and 12 for financial net wealth). The age-wealth profiles implied by the regression estimates are graphed in figures 14 and 15. The

[19] Following the normalization of Deaton's (1994).

cross-sectional profile shows that wealth accumulation peaks around the age of 65 and slowly decline later in life. Comparing the cross-sectional profile with the cohort adjusted one reveals the extent of the bias that results from failing to control for cohort effects. In particular, no decumulation is observed in the cohort adjusted estimates.

One has to be careful in interpreting those results since it is well known that inference on repeated cross-sections suffer from potential sample selection bias caused by differential mortality. Differential mortality bias is due to a lower mortality rate among the wealthiest individuals. As a result, better off households tend to become increasingly overrepresented in older age inducing a potentially severe upward bias in the estimated wealth accumulation of the elderly (Shorrocks (1975)).

Recent studies that have examined the effect of mortality differential bias include Xiaofen (1997) and Attanasio and Hoynes (1995) who employ the SIPP data. Attanasio and Hoynes propose a complex technique for estimating the dependence of mortality rates on wealth and from them building a set of individual weights. These weights are then used to correct the cross-sectional age-wealth profile implied by the pooled sample of the 1984 and 1987 release of the SIPP. The authors found that the corrected profile reduces the mean wealth of those aged 75-79 by about 15%. This result gives a rough estimate[20] of the potential effect of differential mortality on the profiles given by figures 14 and 15. From their results it appears unlikely that controlling for mortality differential bias

[20] Attanasio and Hoynes (1995) include only married couples in their analysis. If wealthier individuals marry later, a sample of married couples may have an over-representation of poor households at young ages. This would an impart a bias on the beginning of the age profle much like that which differential mortality imparts on the end of the age profile (though of opposite sign). I have kept all households in my analysis.

In addition, my pooled sample includes more survey years so that one has to be careful in transposing their results to this paper.

would change the main findings of this paper. It would attenuate the predicted positive rate of wealth accumulation found without reversing its sign.

The cohort effects derived from the cohort spline estimates are reported in figure 16 for both total net wealth and financial net wealth. Following Jappelli (1999), I also reestimate the cohort effects in wealth, replacing the cohort polynomial with an index of generation specific productivity growth (captured by the real GDP per capita at the labour market entry year of the household head[21]). This allows me to roughly test whether the cohort effects are due to generation specific productivity growth. The resulting cohort effects are reported in figure 17 along with the cohort effects implied the spline in year of birth of the head for comparison. The main finding is the poor fit of the productivity index suggesting that part of the inter-cohort differences in wealth may be due to factors other than productivity growth. I find a correlation between the two sets of cohort effects of (0.81) which contrasts with Jappelli who found a much stronger correlation of (0.98) for Italy. While the poor fit of the productivity index might be explained by noting that real GDP per capita a labour market entry year is a poor proxy for generation specific resources, this cannot explain why the same index provides a much better fit in Italy.

Sources of cohort effects other than productivity growth include shifts in preferences or the introduction of social security wealth (Kapteyn, Alessie ad Lusardi (1999)). Intuitively, cohorts who do not expect any social security transfers should have a higher incentive to save so that we should observe a higher level of wealth accumulation. Therefore, one should observe a negative effects on the rate of the wealth accumulation for the cohort born after the introduction of social security.

[21] As in Jappelli (1999), we assume that each generation enter the labour market at age 25.

I have extended my basic specification by including a set of basic demographic variables and regional dummies to control for these determinants of households lifetime resources. This reduced form specification also gives us a measure of heterogeneity across socio-economic groups. The regression results for total net wealth are reported in columns 2 and 4 of Table 11 and for financial wealth in columns 2 and 4 of Table 12. The estimates confirm the preliminary descriptive results. Households headed by a white married male with higher education tend to accumulate more wealth. The dummy for self-employment is large and positive. The resulting upward shifts of the age profile in the presence of uninsurable income risk is consistent with theoretical work of Caballero (1991). A similar finding is reported by Jappelli (1999).

Following Jappelli (1999), I look at the profile of different groups defined by the educational attainment of the head of household. Many life cycle variables (such as earnings) which may affect the shape of the age-wealth profile differ across educational groups. I have defined three education categories based on the highest grade achieved. The first group include households whose head stayed at most nine years in school (elementary education). The second group include all the households whose head reported between 9 and 13 years of education (Some high school) while the last group regroups all the households whose head spent over 13 years in school (post secondary education).The regression results are reported in Tables 13 and 14 while the implied age-wealth profiles are plotted in Figures 18 to 21. As expected, the estimated profiles reveal that the level of wealth accumulation is an increasing function of educational attainment. More surprising is the similarity in the shape of each profile which suggests a very homogeneous pattern of accumulation across educational groups. Indeed, variables likely to affect the shape of an household age-wealth profile, such as social security

replacement rates, are known to vary across educational groups. Yet, regardless of the social security replacement rates faced by households in each educational group, the absence of wealth decumulation in each educational group is further evidence against life-cycle models.

Quantile regression offers an alternative way to look at potential heterogeneity in the sample. Figure 22 displays the profiles implied by the 25th, 50 and 75th quantile regressions. Results from the 50th and 75th percentiles follow those reported above in indicating that elderly households never start depleting their wealth. On the contrary, for the 25th wealth percentile a minor decline is observed. In fact, the decline is most likely underestimated as I do not control for differential mortality. However, mild dissaving in older age by the 25th percentile household (who do not hold much wealth to begin with) is not strong support for life-cycle models.

6 Concluding Remarks

Using cohort data from the SIPP survey, this paper has examined the pattern of wealth accumulation among US households and tested a basic prediction of standard life-cycle models. A strict interpretation of the estimated age-wealth profiles presented in this study leads to a rejection of standard life-cycle models. In particular, I do not find any evidence that households are depleting their assets upon retirement. However, because the definition of household net wealth in the SIPP data does not include social security and occupational pension wealth, this conclusion must be tempered. Indeed, if future pension rights are considered as part of dissaving in older age, some dissaving may be occurring.

Rather than the absence of dissaving by the average (or the median) household in the data, it is the lack of substantial wealth holding by a large number of

households which should catch our attention. The theory predicts that forward looking households accumulate wealth over the life-cycle to finance consumption upon retirement. However, our descriptive results confirm that a large number of households reach retirement having saved very little. Many recent studies have challenged this conclusion[22] arguing that once social security and occupational pensions are included in the definition of wealth, adequate levels of retirement saving are found.

Egen, Gale and Uccelo (1999) suggest that the low levels of private savings observed in the data may actually be consistent with rational retirement planning after comparing empirical wealth earning ratios with simulated ones from a life-cycle model. However, while the lack of private savings may be an optimal response to the incentives inherent in current institutions, this does not exclude the possibility that the lack of saving by these households arises from short planning horizons or liquidity constraints.

In fact, direct evidence from the Health Retirement Survey (HRS)[23] suggests that many households have not thought very much about retirement and that they do not understand very well the complexities of occupational pensions and social security rules. For instance, Lusardi (2000) looks at the impact of planing on the level of wealth accumulation of US household using data from the Health Retirement Survey. Her main findings suggest that many households have not thought about retirement or made any plans for retirement. In particular, her study reports that younger individuals (early 50's), non-white, female, single and do not have a high school education are less likely to plan for retirement. Interestingly, I find that these characteristics are also associated with low levels

[22] See Gustman and Steinmeier (1998), Egen, Gale and Uccelo (1999).

[23] See Gustman and Steinmeier (1999), Lusardi (2000).

of wealth accumulation.

There is no agreement on whether households plan for their retirement adequately.[24] Nonetheless, that social security annuities is the main source of payment for a non-negligeable number of elderly households (about 30%) is an undisputed fact. Whether these households would be able to respond adequately to future reduction in social security paiement is the important issue which needs to be addressed. Kapteyn, Alessie and Lusardi (1999) find evidence for the Netherlands of a negative impact on savings for the cohorts who entered the labour market after the introduction of social security. My finding of a poor fit of the productivity growth to capture cohort effects may suggest the existence of a similar effects in the US. Therefore, modelling cohort effects to capture the impact of the introduction of social security on the wealth accumulation of US households appears an interesting extension of this paper. Indeed, the response to the introdction of social security may be our best guide to the consequences of altering social security.

The PSID is an alternative source of wealth information which has not been used for cohort studies. Furthermore, as the wealth information in the PSID covers the same time period as the SIPP data reported here, a direct comparison of the two would be interesting. This is left for future research.

[24] See Thaler (1994), Gustman and Steinmeier (1998), Egen, Gale and Uccelo (1999), Lusardi (2000) among others.

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8 Appendix: Regression Results & Figures

Table 1: Distribution of Households by Panel and Year of Reference

Reference Year(s) / Survey Year	84	85	86	87	88	
84	20,263					
85		14,043				
86			11,543			
87					11,536	
Reference Year(s) / Survey Year	**90**	**91**	**92**	**93**	**94**	**95**
90	15,408	5,066				
91			9,815	3,205		
92			13,718	4,559		
93					13,295	4,383

Table 2: Percentage of Households with Negative Net Wealth Holding

	All Race						Non-White	
Panel	All		Male		Female		Female	
	All age	55-65	All age	55-65	All age	55-65	All age	55-65
84	11.1	5.3	7.9	3.12	17.8	10.63	40.0	26.33
85	12.2	6.7	9.0	3.91	19.2	13.51	39.3	35.55
86	12.1	6.4	8.7	3.53	19.4	13.17	40.1	32.76
87	11.0	6.1	8.1	4.18	17.2	10.92	35.4	21.78
90	11.9	6.6	8.8	3.95	18.2	12.81	37.3	28.72
91	11.7	5.7	8.6	3.79	17.5	9.73	30.5	20.55
92	12.5	6.2	9.3	3.71	18.3	11.33	33.7	20.72
93	10.3	5.9	7.7	3.95	14.9	9.69	26.3	20.29

Own Elaboration using the SIPP data. All frequencies computed using SIPP sample weights.

Table 3: Median of Financial Net Wealth (55≤age<65)

Panel	Male Head	Female Head
84	16980	4985
85	20165	5760
86	22250	5250
87	27657	6950
90	25750	6325
91	27379	8241
92	28622	8544
93	28185	9548

Table 4: Median of total Net Worth (55≤age<65)

Panel	Male	Female
84	72618	35031
85	75217	36991
86	80109	37835
87	96782	47992
90	97999	42973
91	106712	55954
92	109461	57468
93	113698	58017

Table 5: Distribution of Households Net Worth by decile

Year	84	85	86	88	90	91	92	93	94	95
Decile										
1	-1782	-2072	-2266	-2659	-4229	-4465	-5268	-4724	-5552	-6155
2	613	611	622	654	609	614	587	609	615	596
3	3520	3515	3609	3597	3611	3564	3609	3768	3486	3522
4	11300	11462	11416	11380	11288	11333	11355	11446	11427	11404
5	25196	25333	25172	25150	25030	24943	25056	25362	25116	25035
6	43754	43613	44006	43524	43484	43171	43876	44338	43801	44040
7	67341	67667	67262	67413	67836	67388	67618	67334	67476	67809
8	101113	101169	102136	100996	101393	101923	101796	101424	101317	100886
9	159313	159423	162589	161942	161004	160392	161896	160401	161814	162739
10	365323	352131	356835	355253	379794	379163	378835	361683	391759	390256

Source:own calculation using the SIPP data. All values express in 1984 constant dollars.

Table 6: Net Wealth Statistics by Year of Birth of the Household Head

Year of Birth (1)	Mean (2)	25^{th} Percentile (3)	Median (4)	75^{th} Percentile (5)
1915-1919	115594	26507	74653	150243
1920-1924	124835	29315	79060	164912
1925-1929	124493	28133	78133	165359
1930-1934	116101	22365	70014	152279
1935-1939	106295	16116	61223	138721
1940-1944	90426	10730	48543	116443
1945-1949	73218	6075	35362	93454
1950-1954	55260	3050	22333	67837
1955-1959	36071	1103	10656	41930
All Cohorts	85770	6951	43115	110821

Wealth expressed in thousands of 1984 constant dollars. All Statistics are computed using sample weights.

Table 7: Financial Net Wealth Statistics by Year of Birth of the Household Head

Year of Birth	Mean	25^{th} Percentile	Median	75^{th} Percentile	95^{th} Percentile
(1)	(2)	(3)	(4)	(5)	(6)
1915-1919	55545	3209	18995	64883	232358
1920-1924	59552	3696	21850	70843	246273
1925-1929	56641	3100	19174	68050	239500
1930-1934	52187	2700	15975	57730	226605
1935-1939	45300	2500	13222	46501	203050
1940-1944	38987	1450	10266	35772	184141
1945-1949	30586	900	7838	28200	142569
1950-1954	23683	575	5758	20700	107748
1955-1959	16254	199	3957	14379	75850
All Cohorts	35350	1000	8225	32738	165025

Wealth expressed in thousands of 1984 constant dollars. All Statistics are computed using sample weights.

Table 8: Households selected asset share of total Wealth (All Sample)

	(1)		(2)		(3)		(4)		(5)	
Panel	all	55-60	all	55-60	all	55-60	all	55-60	all	55-60
84	40.4	49.2	2.5	2.7	1.9	3.3	25.1	13.6	16.2	16.2
85	40.0	47.9	2.8	3.3	2.4	3.6	23.8	12.8	16.8	16.9
86	38.9	48.0	3.1	3.3	2.9	4.4	22.8	13.5	17.4	15.8
87	39.3	47.8	3.2	3.9	3.2	5.2	24.8	14.5	16.1	14.6
90	37.8	46.7	3.2	3.4	3.6	5.5	25.3	15.2	16.6	14.5
91	40.3	49.4	3.6	3.8	4.2	6.2	24.9	14.1	14.2	12.8
92	40.0	49.1	3.8	4.4	4.2	6.7	24.9	14.3	14.5	12.3
93	38.4	47.6	3.6	3.6	4.8	6.8	32.2	18.8	12.0	10.4

(1) Households total home equity
(2) Households total equity
(3)Households IRA and Keogh
(4)Household total vehicles
(5)Households interest bearing assets

Table 9: Mean of Household Net Worth by wealth quartile (50<age<60)

	Pension Covered	Not Covered
1	-2289	-1134
2	13470	12575
3	47246	45727
4	165111	178574

Table 10: Cohort-year cell size

	Year									
Cohort	84	85	86	88	90	91	92	93	94	95
1915-1919	1,354	876	730	691	793	264	1,213	390	610	216
1920-1924	1,529	1,041	795	836	1,050	322	1,423	471	801	239
1925-1929	1,477	1,060	850	861	1,050	368	1,513	510	890	289
1930-1934	1,519	1,054	828	754	923	328	1,497	488	804	289
1935-1939	1,588	1,019	804	819	1,118	341	1,607	521	863	284
1940-1944	1,734	1,212	1,039	980	1,296	432	1,913	634	1,073	369
1945-1949	2,161	1,555	1,225	1,242	1,662	551	2,445	830	1,335	439
1950-1954	2,200	1,554	1,339	1,333	1,786	547	2,702	881	1,515	491
1955-1959		278	582	872	1,783	624	2,862	945	1,551	531

Table 11: Dependent variable: log of Household Net Wealth

	(1)	(2)	(3)	(4)
Age	0.88282	1.06956	1.63708	1.62255
	(48.18)**	(60.54)**	(10.92)**	(11.43)**
Age^2	-0.32553	-0.19453	-0.20138	-0.12958
	(49.65)**	(28.97)**	(8.01)**	(5.40)**
Age^3	0.03171	0.01714	0.03800	0.03284
	(10.61)**	(5.89)**	(3.18)**	(2.90)**
Married		1.65078		1.80932
		(40.40)**		(38.67)**
Non-white		-1.89353		-1.93591
		(37.60)**		(33.63)**
Education		0.23820		0.26905
		(48.76)**		(49.05)**
Self-employed		1.61807		1.47117
		(34.09)**		(30.27)**
Female		-0.47122		-0.34159
		(11.15)**		(6.97)**
Mid-west		0.31519		0.29326
		(7.33)**		(6.23)**
South		0.02348		-0.05444
		(0.56)		(1.18)
West		0.01492		-0.04898
		(0.31)		(0.91)
Cohort effects	no	no	yes	yes
Time effects	yes	yes	yes	yes
Obs	126694	126694	92116	92116
R^2	0.10	0.17	0.05	0.14

Robust t-statistics in parentheses. * significant at 5% level; ** significant at 1% level

Table 12: Dependent variable log of Household Financial Net Wealth

	(1)	(2)	(3)	(4)
Age	0.92011	1.05064	1.71990	1.66290
	(84.51)**	(98.01)**	(10.16)**	(10.25)**
Age^2	-0.16569	-0.04643	-0.09853	-0.03365
	(27.72)**	(7.64)**	(4.34)**	(1.55)
Married		1.21608		1.40135
		(26.34)**		(25.57)**
Non-white		-2.26925		-2.34319
		(40.20)**		(35.51)**
Education		0.29547		0.32622
		(52.25)**		(49.52)**
Self-employed		2.11789		1.98847
		(34.12)**		(30.10)**
Female		-0.61869		-0.53359
		(13.02)**		(9.32)**
Mid-west		0.30780		0.29301
		(6.12)**		(5.08)**
South		-0.11077		-0.18767
		(2.30)*		(3.39)**
West		-0.09872		-0.20890
		(1.77)		(3.24)**
Cohort effects	no	no	yes	yes
Time effects	yes	yes	yes	yes
Observations	126694	126694	92116	92116
R-squared	0.06	0.12	0.03	0.12

Robust t-statistics in parentheses. * significant at 5% level; ** significant at 1% level

Table 13: Regression by education group (Net Wealth)

	(1)	(2)	(3)	(4)	(5)	(6)
Age	1.09432	1.19741	0.88596	1.56537	1.73212	1.57786
	(31.62)**	(45.84)**	(28.57)**	(3.69)**	(8.07)**	(6.95)**
Age^2	-0.15010	-0.22586	-0.42697	-0.12805	-0.20309	-0.18695
	(10.97)**	(26.63)**	(36.67)**	(2.08)*	(5.70)**	(5.01)**
Age^3		-0.00945	0.06833		0.02800	0.06071
		(2.28)*	(12.10)**		(1.69)	(3.07)**
Cohort effects	no	no	no	yes	yes	yes
Time effects	yes	yes	yes	yes	yes	yes
Obs	17610	62070	47014	11508	45124	35484
R^2	0.08	0.12	0.13	0.05	0.07	0.06

Robust t-statistics in parentheses. * significant at 5% level; ** significant at 1% level

Table 14: Regression by education group (Financial Net Wealth)

	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.75424	1.03816	1.22441	0.80131	1.74962	1.92462
	(20.93)**	(72.73)**	(65.90)**	(1.57)	(7.35)**	(7.13)**
Age^2	-0.01740	-0.07084	-0.22421	0.00616	-0.11104	-0.04900
	(1.16)	(8.55)**	(20.30)**	(0.08)	(3.51)**	(1.31)
Cohort effects	no	no	no	yes	yes	yes
Time efects	yes	yes	yes	yes	yes	yes
Obs	17610	62070	47014	10943	45124	35484
R^2	0.04	0.07	0.08	0.03	0.05	0.05

Robust t-statistics in parentheses. * significant at 5% level; ** significant at 1% level

Table 15: Quantile Regressions (Net Wealth)

	(1)	(2)	(3)	(4)
age	0.48436	0.59157	0.70513	0.71600
	(67.16)**	(86.64)**	(13.59)**	(14.06)**
age^2	-0.23600	-0.15137	-0.18775	-0.12481
	(108.68)**	(72.10)**	(23.61)**	(15.98)**
age^3	0.02712	0.01695	0.03468	0.02224
	(24.07)**	(16.12)**	(8.27)**	(5.41)**
Married		0.93476		0.99678
		(70.80)**		(66.02)**
Non-white		-1.18177		-1.13651
		(74.65)**		(65.36)**
Education		0.16180		0.16353
		(93.44)**		(86.17)**
Self-employed		0.81591		0.77945
		(40.69)**		(38.41)**
Female		-0.13552		-0.05038
		(9.91)**		(3.18)**
Mid-west		-0.05617		-0.10743
		(3.64)**		(6.30)**
South		-0.19972		-0.26495
		(13.63)**		(16.42)**
West		-0.06951		-0.08048
		(4.21)**		(4.43)**
Cohort effects	no	no	yes	yes
Time effects	yes	yes	yes	yes
Obs	126694	126694	92116	92116

Absolute value of t-statistics in parentheses. * significant at 5% level; ** significant at 1% level

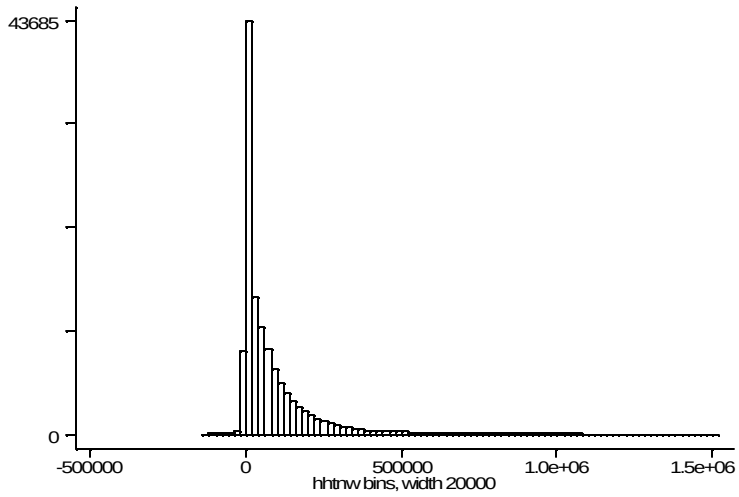

Figure 1: Distribution of household net wealth in SIPP

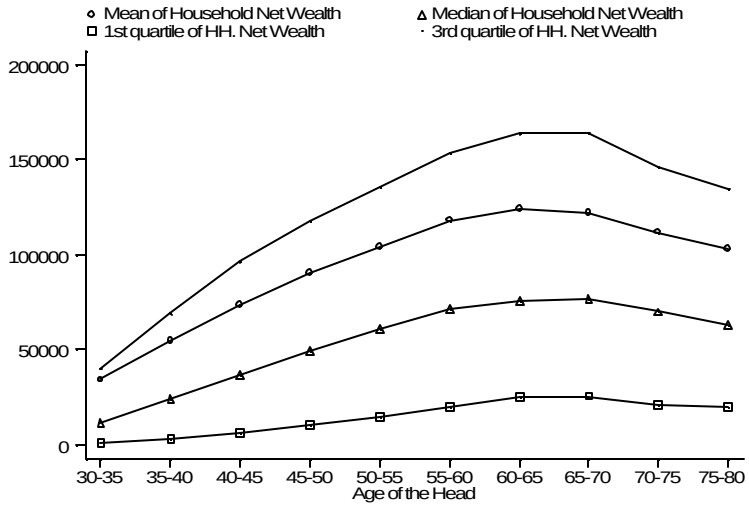

Figure 2: Cross-Sectional Age-Weath Profile

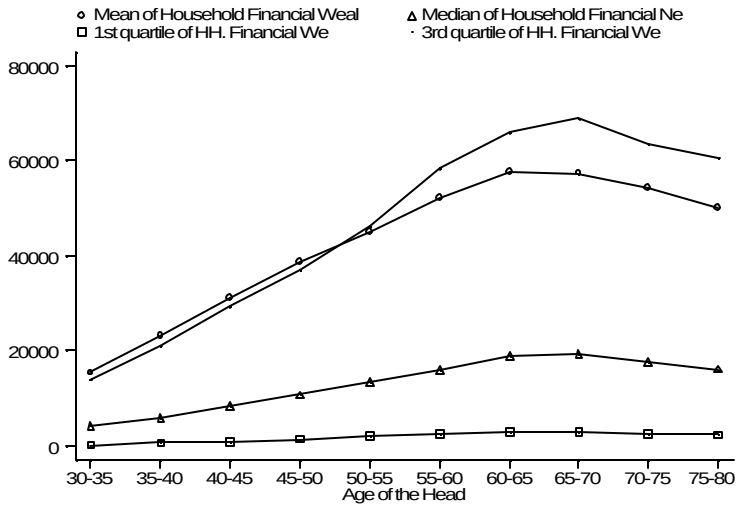

Figure 3: Cross-Sectional Age-(Financial)Weath Profile

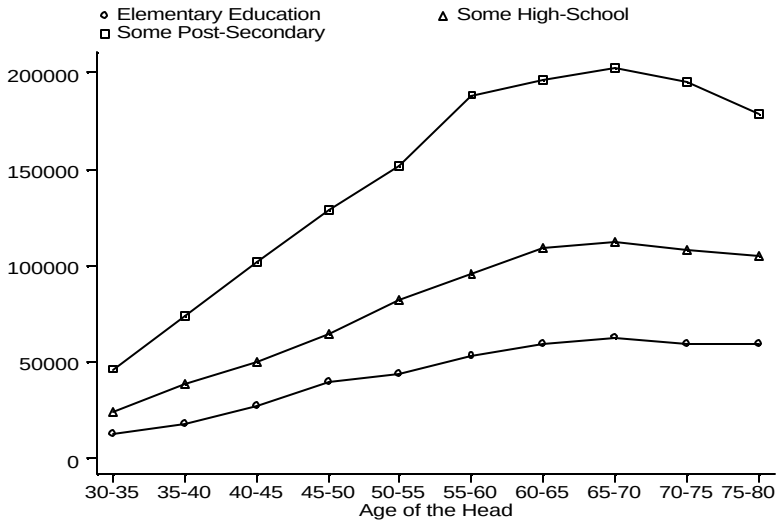

Figure 4: Mean of Household Net Wealth by Education Level

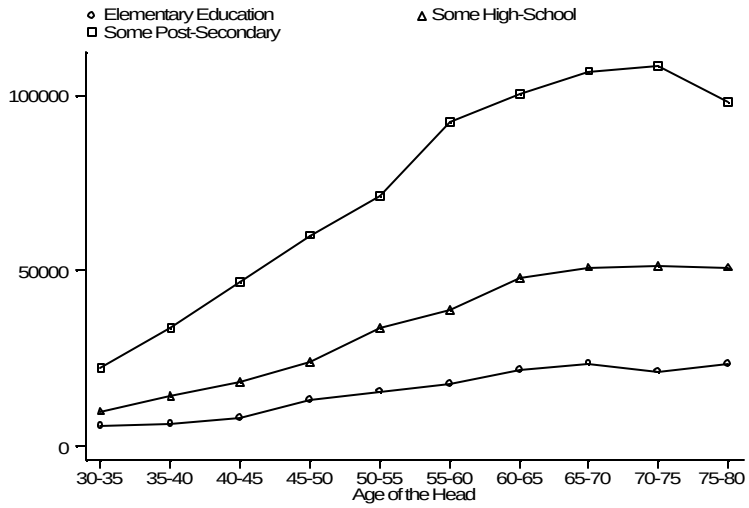

Figure 5: Median Household Net Wealth by Education Level

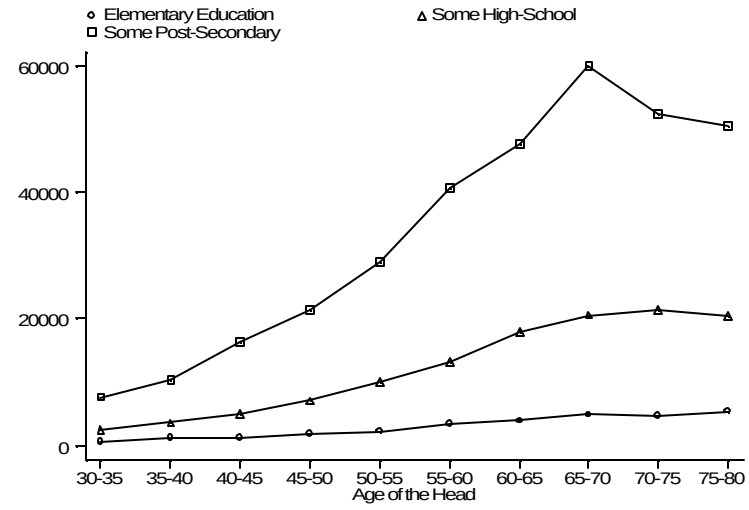

Figure 6: Median Financial Net Wealth by Education Level

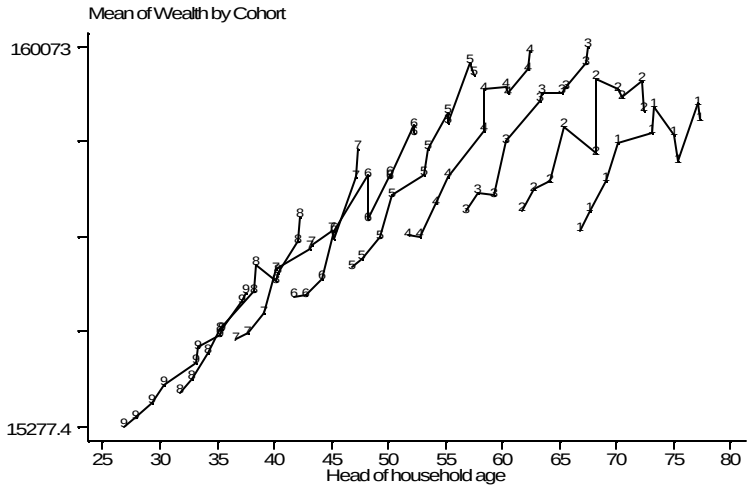

Figure 7: Mean of Household Net Wealth (selected cohorts)

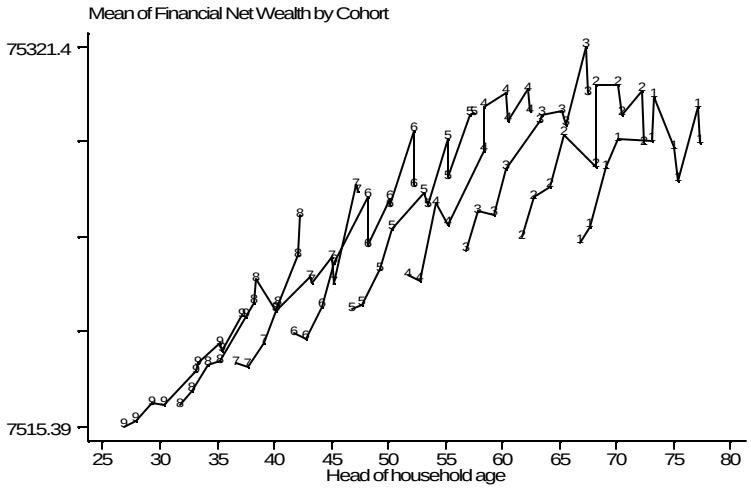

Figure 8: Mean of Household Financial Net Weath (selected cohorts)

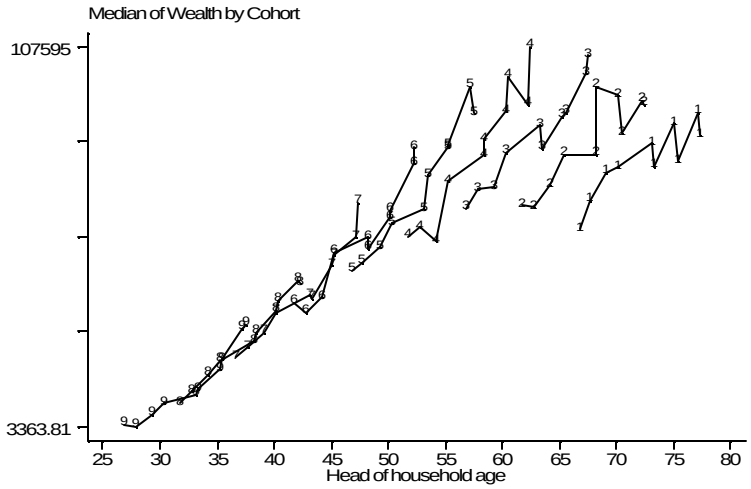

Figure 9: Median of Household Net Wealth

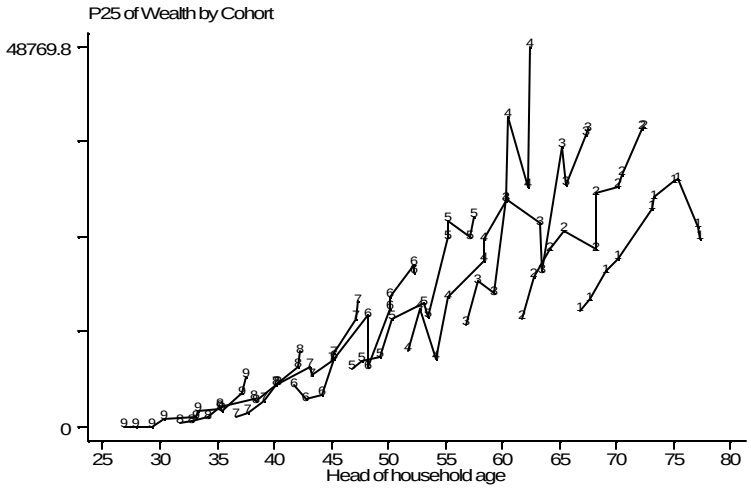

Figure 10: First Quartile of Household Net Wealth

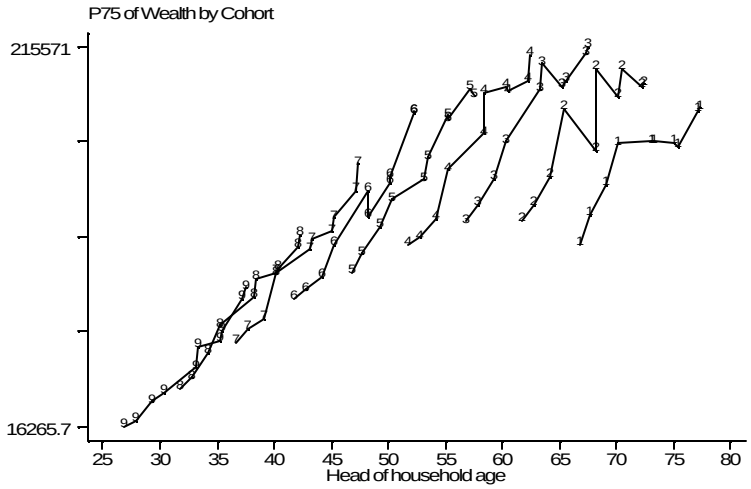

Figure 11: P75 of Wealth by Cohort

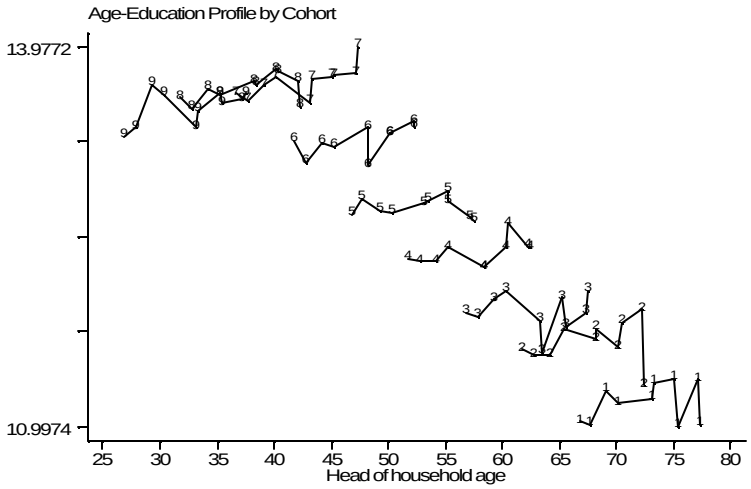

Figure 12: Age-Education Profile

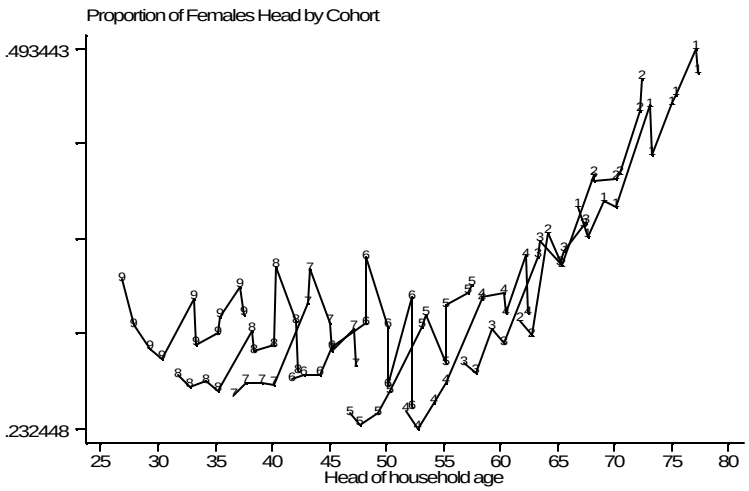

Figure 13: Proportional of Females Head by Cohort

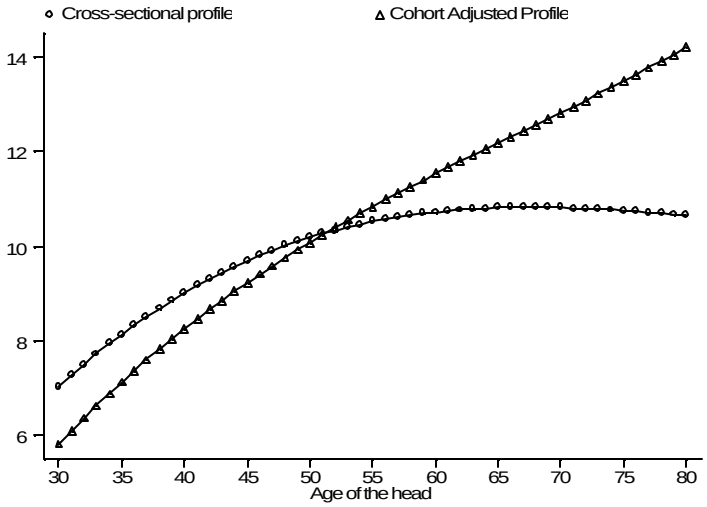

Figure 14: Age-Wealth Profile: Household Total Net Wealth

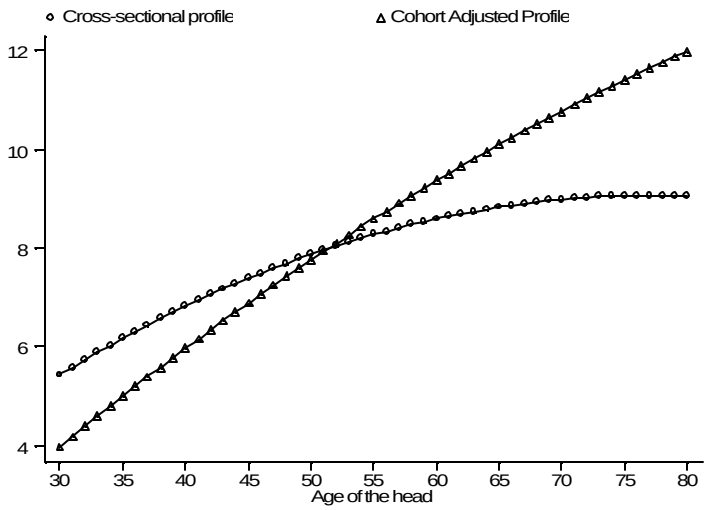

Figure 15: Age-Financial Wealth Profile

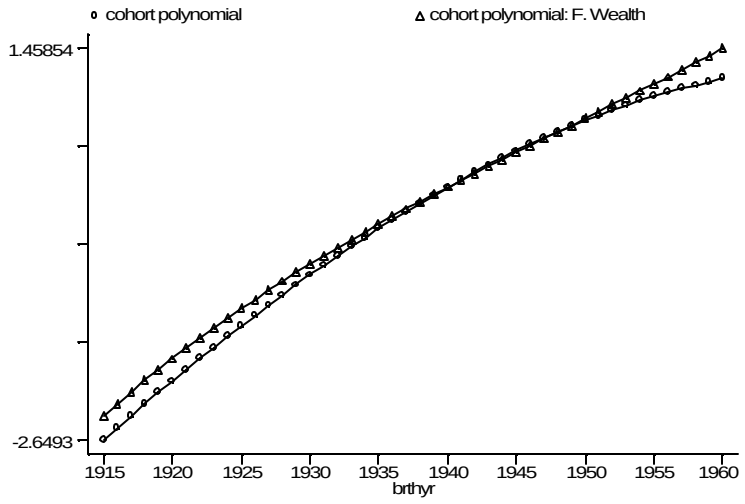

Figure 16: Cohort Effects

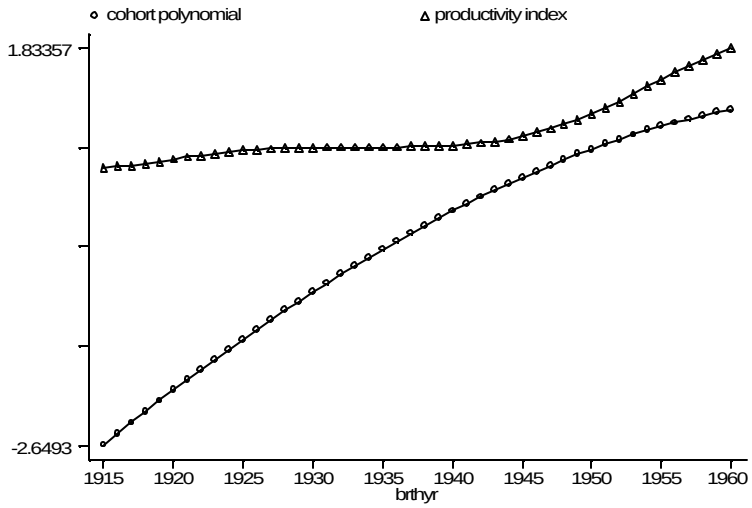

Figure 17: Cohort Effect in Household Net Wealth

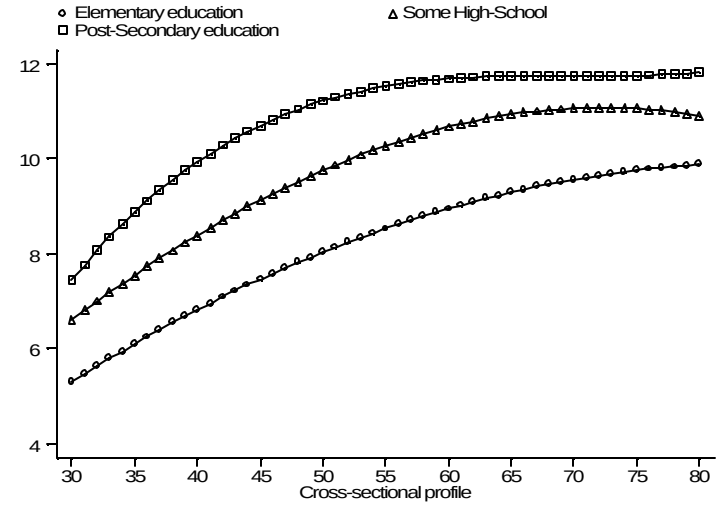

Figure 18: Age-Wealth Profile by Education Level

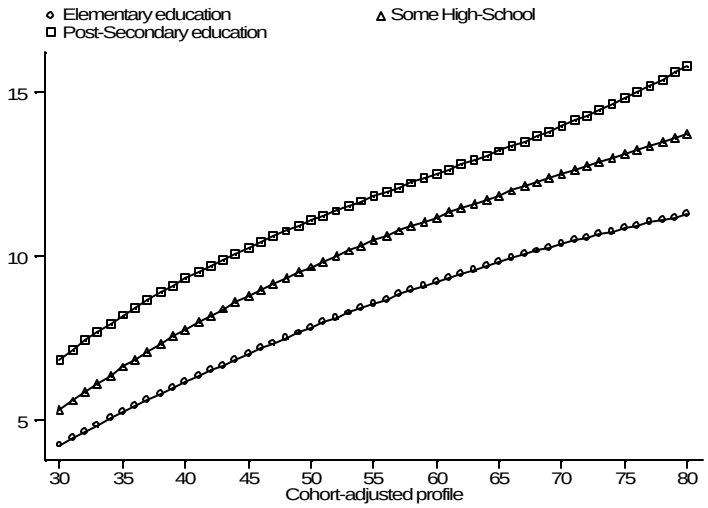

Figure 19: Age-Wealth Profile by Education Level

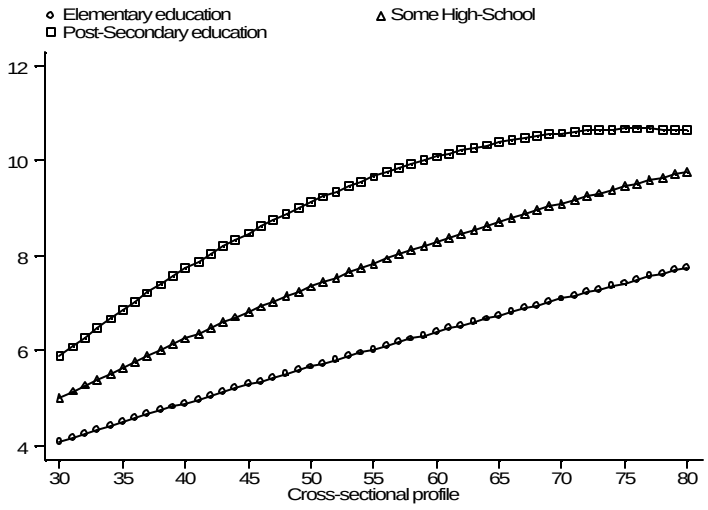

Figure 20: Age- Financial Wealth Profile by Education Level

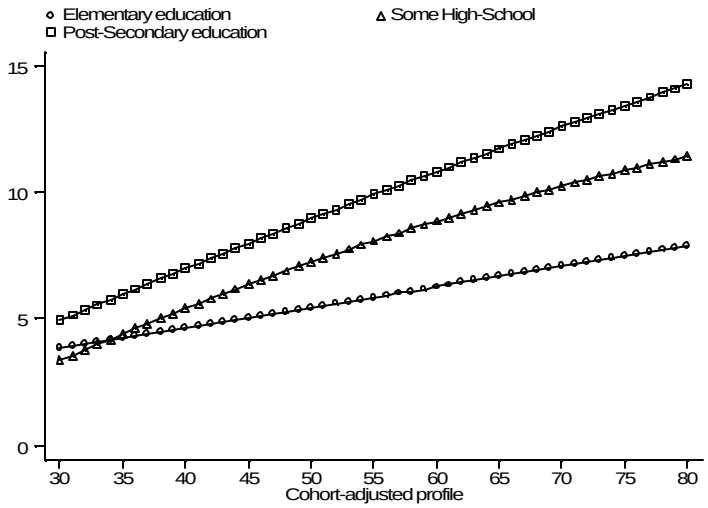

Figure 21: Age-Financial Wealth Profile by Education Level

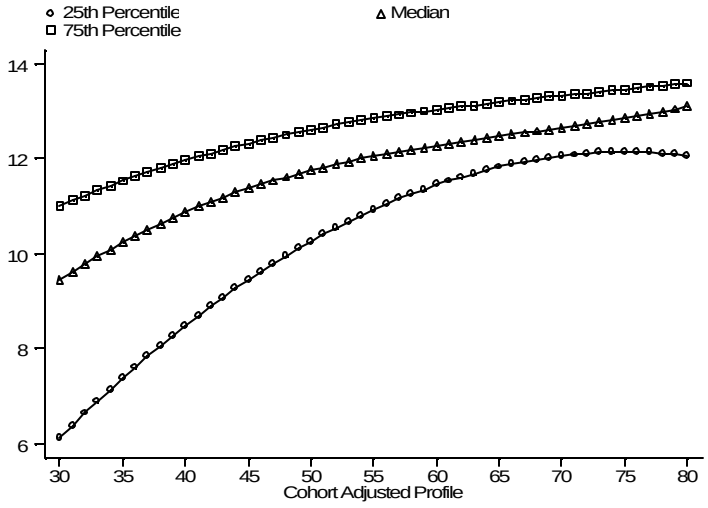

Figure 22: Age-Wealth Profile (Quantile Regressions)