A Cohort Analysis of Consumption and Earnings in Iran: 1984-2002

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Abstract

Iran has experienced a multitude of changes in recent decades. Revolution, war, peace, more mundane macroeconomic shocks, as well as dramatic changes in fertility and household structure. The conventional description of these events uses aggregate data such as GDP per capita, household size, and total fertility rate (TFR) to show how these events have been translated to *average* behavior. Household surveys can tell us more about these events that we can glean from changes in mere averages from one survey to the next. Due to the fact that consumption, earnings, and household formation depend on the age of the person, when he was born, and what particular year we are looking at, we consider the evolution of consumption and earnings of cohorts of individuals or households. By grouping individuals or households into cohorts, as opposed to aggregating all of them, we are able to obtain separate age, cohort, and time profiles. The time effects pick up the trends noticeable in the macro data, whereas the age profiles show the typical inverted U-shape. The cohort profiles show that, after taking into account the age of head of the household and year of survey, the younger generation in Iran has fared better than the older generation in the post-revolution transition.

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1 Introduction

Iran has experienced a multitude of changes in recent decades: revolution, war, peace, more mundane macroeconomic shocks, as well as dramatic changes in fertility and household structure. This paper examines the impact of these events on the welfare of Iranian households using data from nineteen consecutive household income and expenditure surveys, from 1984 through 2002. The conventional description of such events uses aggregate data such as GDP or consumption per capita, household size, and total fertility rate (TFR) to show how these events have impacted the economy. Alternatively, using household data, we can show how *average* consumption or income per head and family size have changed from one year to the next as the country moved from one crisis to another (1986-90, 1993-95), or as peace arrived unexpectedly in 1988.

However, household surveys can tell us more about these events than we can glean from changes in mere averages from one survey to the next. For instance, if all individuals in the survey lived for one year only, there would be nothing more to learn from the data than averages. The fact that individuals or households are born or formed in one year and survive over a number of years implies that we should consider any serial dependence that is created from their persistence from one survey to the next. In general, people accumulate human or physical capital, which are recognized to have long-lasting effects on their welfare. Depending on when people are born, or households formed, the opportunities to accumulate these two types of capital may not be the same. These opportunities may differ due to a war, a change of regime, economic depression, or even natural disasters. For instance, if, for any of these reasons, child schooling were affected, the longer lasting effects would be reflected in a lower educational attainment in adulthood, and very likely, lower lifetime earnings. Similarly, a cohort of households that were formed when the oil boom was in full swing (1974-80) and were, therefore, able to accumulate consumer durables, are expected to behave differently during a slump (1985-99) compared to households that were formed later.

Such reasoning leads us into adopting a cohort approach to examining changes in con-

sumption, earnings, and household size and structure. Both theoretical and practical considerations suggest that we work with cohorts of individuals or households (using characteristics of the household head). From a theoretical point of view, for welfare comparisons, it is important to consider individuals (households) at the same point in their life cycle. Use of cohorts, where cohorts are defined by year of birth, allows us to do just that. From a practical point of view, the use of cohort techniques is necessary due to the absence of true panel data. The large number of households surveyed (up to 35,000) and the large number of cross-sections allows us to track cohorts of people through time, and to observe the evolution of their levels of earnings and consumption.

In addition, questions about winners and losers from economic development can be conveniently addressed by following cohorts over time (Deaton, 1997). In particular, an important distinction between cohorts suggests itself in the Iranian context. The Islamic Revolution of 1979 brought about fundamental changes in the political, social, and economic spheres of Iran. As a result, households that were formed a substantial number of years before the revolution, and those that were formed afterwards may have been affected in different ways by economic shocks for a number of reasons. One reason could be that the former lived during a period of plenty, and could have accumulated assets, housing, and consumer durables. They may have also accumulated a certain type of social capital (contacts, regime-specific type of human capital, and other assets such as a wardrobe) which were not so useful under the Islamic regime. Use of cohort techniques allows as to test whether cohorts of households that were formed before the revolution fared worse during the post-revolution transition than households formed later.

Finally, a number of the quantities most closely associated with welfare, including family size, earnings, income, and consumption have distinct characteristic life-cycle profiles. Wages, earnings, and savings typically have hump-shaped age profiles rising to their maximum in the middle years of life, and declining somewhat thereafter (Deaton, 1997). The process of child bearing and raising children induces a similar profile in family size. Furthermore, all these quantities are subject to secular variation as consumption, earnings,

and income rise with economic development, whereas family size decreases as countries go through the demographic transition.

An age profile from a single cross-section confounds the age profile with the generational or cohort effect. For example, a cross-sectional age profile may exaggerate the downturn in earnings at the highest age because, as we look at older and older individuals, we are not just moving along a given age-earnings profile, but also moving to ever lower lifetime profiles. Use of the cohort data allow us to track the same cohorts over several years and avoid the difficulties of using a single cross-section.

The availability of micro data allows us to consider other social phenomena that potentially affect welfare. In this paper, we carefully document the demographic transition in Iran by examining changes in fertility and household size, as well as consider changes in household structure. Additionally, we construct age, cohort, and time profiles for consumption and earnings, and household size, focusing more on the cohort and time profiles.

The remainder of the paper is organized as follows. The next section provides an overview of the economic and political developments in Iran during the last 25 years. Section 3 provides a description of the surveys and compares trends in the surveys with trends in the aggregate data. Section 4 describes the construction of cohorts and provides a brief overview of the literature on the time series of cross sections. Changes in fertility, family size, and household structure are examined in the first subsection. The second subsection discusses consumption and earnings differences among the HEIS households over time. Section 5 formalizes the visual findings of Section 4 by presenting a method of decomposing consumption and earnings into age, cohort and year effects. Concluding remarks and avenues of future research are presented in the last section.

2 The Iranian Context

More than two decades have elapsed since the 1979 Revolution and the establishment of the Islamic Republic of Iran. Since then, the Iranian economy has been subject to a number of major upheavals, disruptions, and shocks, both internal and external in nature. These

include the effects of the Islamic Revolution, the eight-year war with Iraq, the import compression of the mid-1990s, and the ongoing economic and financial embargoes by the United States, and on occasion, by some European economies. In addition, volatile international crude oil prices, uncertainties surrounding the conduct of monetary, foreign exchange, and trade policies in the 1990s have contributed to lower-than-expected growth rates.

The Islamic Revolution brought significant changes to the structure of the Iranian economy. During the 1980s, Iran's economic structure resembled that of a centrally planned economy. As a result of confiscations shortly after the Revolution, nearly all major banking, industrial, and service institutions came under government control. To some extent, these nationalizations were forced upon the government as in many cases the owners and managers of factories had left the country, and some enterprises were in the verge of collapse. The role of the government, or alternatively, of the private sector and markets, have continuously been debated by the regime since. However, during the 1980s, direct government controls were increasing, in part due to the exigencies of running the economy while at war with Iraq.

Only a few months after the revolution, tensions along the border with Iraq started and rapidly escalated to the point that, in September 1980, Iraq officially declared war on Iran. In order to deal with the war, in addition to the aftermath of the Revolution, the government introduced an intricate system of subsidies for a large number of commodities. The subsidies have been effective in containing poverty in times of economic decline, but the delivery system has been generally quite inefficient (Salehi-Isfahani, 1998).

A rigid structure of the economy, combined with a relatively high dependence of the government on oil revenues, rendered the Iranian economy highly vulnerable to the collapse of oil prices in 1986. The shock caused a dramatic drop in oil revenues per person to one-tenth of their value twenty years earlier, and brought a very tough challenge to an economy that, at its peak, depended on oil revenues for 95 percent of exports and 80 percent of the budget. The shortfall in oil revenues at a time of increasing demand for government resources led to substantial budget deficits, which heightened inflationary pressures in the

economy. This also intensified the growing shortages resulting from import restrictions, economic sanctions, and war damage, forcing the government to impose further commodity rationing and controls in the product markets.

The expanded government role in the post-revolutionary period was manifested not only in a shift of balance from private to public ownership, but also through direct interventions in the operations of markets. These included foreign exchange controls, maintenance of a system of multiple exchange rates, controls on interest rates and bank credits, as well as direct price controls in a large number of product markets. Over time, substantial and entrenched price distortions developed in the economy with serious consequences at all levels of economic activity from investment to production, trade, distribution, and consumption (Karshenas and Pesaran, 1995). During the war, government policy consisted of a combination of measures such as subsidization, direct control of prices, and two-tier pricing based on coupon allocation for certain products. As a result, by the end of the war, there was an extensive network of official markets for some 300 price-controlled products. At the same time, the prices of key products such as energy and bread had fallen to well below 10 percent of the corresponding international prices.

Throughout the 1980s, the problems related to the extensive controls of prices, trade, and the exchange rate had become too obvious. At the end of the war, the Iranian government decided to embark on an extensive economic reform and adjustment program. The First Five-Year Development Plan, introduced in 1989, provided a framework for liberalizing the economy and dismantling the centrally administered model of resource allocation that had developed during the war years. The market reforms in this phase were intertwined with a broader, state-led reconstructive drive to resuscitate the economy.

The initial years of the Plan were a success. Trade and price liberalizations, combined with a fortuitous doubling of oil revenues, led to a rapid increase in consumer demand. As a result, private consumption increased by 19.5 percent in 1990 and 9.5 percent in 1991. Furthermore, Iran's needs for consumer goods, as well for intermediate and capital goods, led to a two-fold increase in imports between 1989 and 1991.

However, a boom of this nature and scale could not be sustained for a long period of time (Pesaran, 2000). In fact, the pace of economic activity slowed down noticeably after 1991. There were several reasons. Due to the large increase in imports, the government saw the current account balance deteriorating with the deficit suddenly jumping to $9.5 billion in 1991 from a surplus the year before. The weakening of the oil market led to a drop in oil revenues in 1992, after which they remained around $14 billion in 1993 and 1994. Foreign debt accumulated rapidly to a peak of more than $23 billion in 1993, over three quarters of which was short-term debt. As emergency measures were adopted to deal with the debt crisis, reforms were scaled back: controls of prices, trade, and the exchange rate were reimposed. To pay back the foreign dues the government enforced a compression of imports–in 1994 imports were merely 50 percent of what they had been in 1991 and 1992. Last, but not least, these years saw a continuation of the inflationary build-up: the consumer price index jumped by 35 and 49.5 percent in 1994 and 1995, respectively. The price index of imported goods increased by as much as 79 percent in 1995.

3 The Data

The data used in this study are drawn from the Household Expenditure and Income Surveys (HEIS) collected by the Statistical Center of Iran (SCI) between 1984 and 2002. These surveys have been collected since 1963, however they are available in electronic format only since 1984. The number of households surveyed varies from over 5,700 in 1986 and 1987 to 32,100 in 2002 and 36,500 in 1995. The number of persons covered varies from about 37,000 in 1986 to over 193,000 in 1995 (Table 2). New samples are drawn each year, so it is impossible to track individual households over time; instead we track individual cohorts through the successive surveys.

The survey questionnaires contain eight modules. The first is the demographics module, which collects information on age, sex, marital status, relationship to the head of the household, education, and employment status. Module 2 contains information on household ownership of assets and amenities. Module 3 records very detailed information on food ex-

penditures; food expenditures can be aggregated into broader groups such as grains, meats, dairy, and so on. Module 4 collects information on non-food expenditures. These include non-durables and semi-durables such as clothing, household items, rent and utilities, etc. The recall period for these expenditures is the last month. Module 5 records expenditures on durables, which include appliances, furniture, vehicles, bikes, as well as expenditures on vacation travel, school tuition, or housing extension. Modules 6, 7, and 8 record individual information on wage and salary income, self-employment income, and other income from retirement, rent, or other sources, respectively.

The sampling design has remained the same over time, but the recording of food expenditures was modified in 1990. For the 1984-89 period the recall period for food expenditures was the last 48 hours in urban areas, and last 24 hours or last month (depending on the item) for rural areas. Starting in 1990, the recall period on food expenditures has been the last month for both urban and rural areas. The recall period for non-food expenditures has remained the same throughout the time period under consideration.

The HEIS follow a two-stage stratified sampling method. The most recent census of population serves as the frame from which, in the first stage, the requisite number of blocks is randomly selected, and in the second stage five households are selected from each block. The sample is stratified by urban and rural locations, as well as by province. The number of blocks (or observations) for each geographic unit (rural or urban areas of each province) is determined taking into account the precision requirements for estimation of certain indices (such as food expenditures). The number of blocks in each unit is simply the total number of observations divided by five. Probability sampling weights are utilized in all of the analysis that follows.

Another feature of the HEIS is that they report expenditures rather than consumption. Hence, only goods acquired through purchase, home production, or government transfers are included. In particular, in-kind inter-household transfers are not reported.

3.1 HEIS Trends

The HEIS data are relatively unexploited; thus it is useful to compare trends in the HEIS with the trends in the aggregate national accounts data. Figures 4-6 show trends in total household and per capita expenditures as well as earnings for the entire sample and by rural/urban separately. The HEIS capture the major trends and event apparent in the aggregate series in Figures 1-3. Total expenditures and earnings started to decline in 1986 and continued the decline until the end of the war in 1989. The years immediately after the war were good years associated with increases in both expenditures and earnings.

The sluggishness of the economy starts to reappear as early as 1992; in 1995, which is when the First Five-Year Plan came to an end expenditures and earnings saw a significant decline. This decline is particularly evident in earnings both at the individual and household level (Figures 6-8). The trends in earnings match very closely those of the wage indices for construction and manufacturing workers provided by Central Bank of Iran (CBI). The apparent similarities between the aggregate and HEIS data are reassuring for the future analysis of the HEIS.

4 Constructing cohorts

The HEIS consist of independent cross-sectional annual data; hence, there is no possibility of following individuals or households over time. It is still possible, however, to follow groups of people from one survey to another. These groups could be the entire population, where we use the surveys to track aggregate data over time, or regional, sectoral, or occupational groups, where we might be tracking the differing fortunes of rural versus urban households, farmers versus industry workers, or lawyers versus teachers.

An alternative use of survey data is to follow cohorts of individuals over time. Provided that the population is not much affected by immigration and emigration, and provided the cohort is not so old that its members are dying in significant numbers, we can use successive surveys to follow each cohort over time by looking at the members of the cohort who are

randomly selected into each survey (Deaton 1997, p. 117). For example, we can look at the average consumption of 30-year-olds in 1984, of 31-year-olds in 1985, and so on. These averages, because they relate to the same group of people, have many of properties of panel data, and can therefore, do most of what would be expected of panel data. In particular, the cohorts can be used to control for unobservable fixed effects just as with panel data, a feature that is often thought to be the main econometric attraction of the later.

Cohort data also have a number of advantages over most panels. Because the cohort data are constructed from fresh samples every year, there is no attrition, which is a typical problem with panels (especially those running for long periods of time). The way in which cohort data are used is often less susceptible to measurement error than in the case of panels. The quantity that is being tracked over time is typically an average, and the averaging usually reduces the effects of measurement error. In a sense, cohort methods can be thought of as instrumental variable methods, where the instruments are grouping variables whose application averages away the measurement error.

The use of cohort techniques is justified not only on technical grounds (because of the absence of a true panel) but also on theoretical grounds. As Blundell and Preston (1998) point out, meaningful welfare comparisons and measures of welfare inequality should compare individuals at the same point in their life cycle. Deaton (1997) states that the most important measures of the standard of living, income and consumption, have strong life-cycle age-related components, but the profiles themselves will move upward over time with economic growth as each generation becomes better off than its predecessors. Tracking different cohorts through successive surveys will allow us to disentangle the generational from life-cycle components in income and consumption profiles.

Cohorts are also interesting in their own right, and questions about gainers and losers from economic development can be conveniently addressed by following such groups over time. Because there are more cohorts alive at one time, cohort data are more diverse and richer than aggregate data, but their semi-aggregated structure provides a link between the microeconomic household-level data and the macroeconomic data from national accounts.

Cohort data can be constructed for any characteristic of the distribution of interest; we are not confined only to means. For instance, medians could be used in the presence of outliers, or the second and third moments of the data can be used when we are concerned with issues such as inequality and distribution (see Deaton and Paxson (1994) for an application to second moments). Furthermore, if the theory suggests taking transformations of the data, the transform can be made prior to averaging. When working with aggregate data, theoretical considerations often suggest working with the mean of the logarithm, rather than with the logarithm of the mean (Deaton, 1997).

The final advantage of cohort methods is that they allow the combination of data from different surveys on different households. For example, we might have a survey in which individuals report earnings but not hours of work, and another survey in which individuals report hours worked. Combining the two surveys would allow us to obtain the average hourly wages for the particular groups we are interested in (see Attanasio and Szekely, 2000 for an illustration).

Against the use of cohort data, it should be noted that there are sometimes problems with the assumption that the cohort population is constant, an assumption that is needed if the successive surveys are to generate random samples from the same underlying population. Potential problems are military service, migration, aging, and death. An additional difficulty arises when we are forced to work not with individuals, but with households, and to define cohorts of households by some characteristic of the head (e.g. age or education). If, once formed, the households are indissoluble, there would be no problem, but social phenomena such as marriage and divorce reorganize the households, as does the process whereby older people live with their children. These problems affect some segments of the population more than others (i.e. the very young or very old age groups), but they should be kept in mind as results are presented. Additionally, remarriage or divorce should not be a concern with the Iranian data, but the elderly living with their children is something the needs to be dealt with.

4.1 The HEIS Cohorts

For the purpose of this paper, we follow cohort means of consumption and earnings in the HEIS. Since for earnings we have individual data, the cohort means of individuals by age provide unbiased estimates of mean earnings for the underlying population of that age. For consumption, which is collected at the household level, things are a bit more complicated. Schultz (1999) points out that household composition is endogenous with fertility decisions, the decision whether to support the elderly within the household, and the incentives of prime-aged adults to live together, all potentially related to the income-earning opportunities open to individuals. The result is that the statistical sample of a birth cohort may change in a nonrepresentative manner as it "ages". In developing countries, in particular, it is fairly common for the elderly to live with their children, and one can imagine cases in which headship of the household is transferred from the parents to the son or daughter as the latter become the main providers for the household. When headship is transferred to the children, the age of the household head may drop by 20 or more years, even though the household composition remains unchanged (Deaton and Paxson, 1994). Hence, averaging by the age of the household head has the inevitable effect of confounding genuine changes in stable households with changes in both household formation and headship.

Household composition First, we consider changes in household structure. As Tables 4a and 4b show, Iran has experienced a significant drop in the percentage of individuals who are household heads for the age groups 20-24 and 25-29 over 1984-2002. For instance, in 1984, 11.7 percent of the 20-24 age group and 33.1 percent of those 25-29 years old were household heads—by 2002, these figures had dropped to only 4.2 and 19.5 percent, respectively. In addition, the percentage of children living with their parents has increased dramatically; from 49.2 percent in 1984 to 74.5 percent in 2002 for the 20-24 age group, and from 20.1 percent to 42.2 percent for the 25-29 age group. On the other hand, the proportion of the people in the age group who are a parent, grandchild, or other relative of the head has dropped significantly. For the older age groups, for instance, the percentage of the age group that are a parent in 2002 is less than half of that in 1984. In our analysis,

the main issue arising from these household composition issues concerns changes in the household head from one year to the next. This might be more of a concern with the oldest and the youngest cohorts, as the elderly (and youth) who head their own household rather than living with their children (or parents) are likely to be unrepresentative of all individuals in a particular birth cohort. In contrast, this is much less of a problem with the middle-aged households as the percentage of individuals being heads or spouses of heads is close to or over 90 percent.

Changes in headship will not be such a concern if the consumption of individuals who are household heads does not differ greatly from individuals in their birth cohort who are not heads. To examine the sensitivity of our results to this issue, we can compare the mean consumption per capita, or adult equivalent, for household heads of a given age to that of all individuals of that same age (McKenzie, 2002). For individuals who are not household heads, we assign them the mean consumption per household unit of the household they live in. Table 5 reports the percentage difference in the mean cohort consumption obtained using only the consumption of household heads of a given age to that obtained using only the consumption of household heads of a given age to that obtained using the consumption of all individuals of that age, using the HEIS data from 1984, 1985, 2001, and 2002 surveys. The most problematic age groups, as expected, are the youngest and the oldest, which is where the differences are highest. It is interesting to note that, for the youngest age groups, those that are household heads have a higher consumption that the rest of the age group throughout 1984-2002. This reflects the fact that only wealthier or, perhaps, more educated individuals can afford to be household heads at this age. For the oldest age groups being the head of the household at 75+ in 1984 or 1985 meant less consumption than the rest of the people. By 2001 the picture had been reversed, with elderly household heads now having a higher consumption than the rest of the people in the age group.

The evidence presented here suggests that the requirement that each of the HEIS surveys is sampled from cohort populations with the same mean properties will hold approximately. While results from estimations using middle-age cohorts are not likely to be affected by

selectivity, we need to be cautious as we interpret any results for the youngest or oldest cohorts.

Fertility Figure 10a shows how the cohort grouping can be used to show both the life-cycle pattern of family formation as well as the cohort effects of the falling fertility. The age of the household head is plotted on the horizontal axis, while the vertical axis shows the average number of children in the household. Children here are defined as individuals of age eighteen or less. The plotted points are connected when we are following the same cohort through time, but different cohorts are left unconnected. To avoid the confusion between different cohorts we only show every fifth cohort so that first line segment from the left in the figure shows the number of children in households headed by those who were 20 in 1984; by the time these people are 38 in 2002, they are well launched into their child-rearing years, and have a little over two children per household. The second cohort, the 25 year-olds in 1984, overlap with the first cohort for 14 years, but take us another five years into the life-cycle since these people are 43 in the last 2002 survey. To the extent that these two cohorts overlap with the next one, the profiles of children by age have similar shapes, with the maximum number of children attained around age 40, and falling thereafter as the oldest leave home and new children cease to be born.

From Figure 10a, it seems that at the same age, younger cohorts have fewer children. This is particulary true for cohorts that were younger than 40 in 1984. To see this, notice that if we draw a vertical line for the overlapping cohort profiles, the intersection will tell us the average number of children for each cohort. To see whether there are any cohort differences in the number of children, we can proceed more formally by regressing the number of children on a set of age, cohort, and year dummies. The idea here to compare the cohorts but also controlling for age of head and year. While the age effects (Figure 10b) show the typical life-cycle pattern of family formation, the cohort effects shown in the lower left panel portray a significant decline in fertility; from head aged 25 to heads aged 60, there has been a decline in the number of children per household from 3.5 to a little over 1.

This remarkable decline in fertility is also shown in Table 6, where we examine the number of children of age less than two belonging to the head of the household. In 1984, the average number of children less than two for women of age 15-49 was 0.34; by 2002, this number has dropped to merely 0.11, which is about one third of 1984.

All this evidence about fertility suggests that cohort differences in the level of consumption might not be simply due to differences in earnings and income (which allow higher consumption) and/or differences in household size. Hence, as we compare the different cohorts over time, changes in fertility and household size should be kept in mind.

4.2 Consumption and earnings

Figure 11a shows real average total expenditures for various cohorts in Iran observed from 1984 through 2002. The data were constructed according to the principles outlined in the previous section. For example, for the cohort born in 1954, who were 30 years old in 1984, the 1984 survey was used to calculate their average household consumption, and the result if plotted as the first point in the third line from the left in the figure. The average consumption for those that are 31 in 1985 is calculated and plotted as the second point in the same line. The rest of the points on that line come from the other surveys, tracking the cohort born in 1954 through the 19 surveys until they are last observed when they are 48 in 2002. In order to keep the plot clear, every fifth cohort is plotted, although graphs for every single cohort could be made. Only members of the same cohort are joined up by connecting lines so that we know whether we are following the same group of households or jumping from from one cohort to another.

A similar plot is constructed in Figure 11b, but now we pool households into five-year cohorts. Now, the third line in the plot shows average total expenditures for households whose head was born between 1950 and 1954, inclusive. There is an advantage and a disadvantage to pooling. The advantage is that we minimize any possible measurement error in the data since the pooled cohort cell sizes become significantly larger. On the other hand, pooling cohorts into five-year groups results in a loss of information for particular

cohorts. It must be pointed out that the need for pooling is particularly critical for 1986 and 1987, since the sample sizes of these years are considerably smaller than the other years–hence, one-year cohort cells turn out fairly small. One should also keep in mind that, by pooling, we are implicitly assuming that one-year cohorts are homogenous.

The plot of the five-year cohorts looks like a smoother version of the plot of one-year cohorts. The two graphs share many similar features, however, we only discuss the former. Several patterns emerge by drawing cohort plots. The first is the inverted U-shape pattern of age; total expenditures increase with the age of the household head until he/she reaches the late forties or early fifties, after which they start to decline.

A second pattern can be discerned by considering each cohort line individually. For most cohorts, the line starts with a slight increase which is followed by a big dip. After that, we notice an upward trend for the younger cohorts, and a flat or downward trend for the older cohorts. These trends in consumption for cohorts can be easily related to the macro trends that we discussed earlier. More specifically, the dip represents the slump of 1986-89, the sharp increase in cohort consumption occurs during 1991-92, and later there was yet another drop in consumption corresponding to the 1995 crisis. It is apparent from the graph that not all cohorts have suffered (gained) equally from these events. The decline in expenditures during the war seems more severe for the older cohorts, whereas the after-war increase in expenditures is sharper for the younger cohorts.

Finally, a third pattern, which is perhaps less intuitive but well present in the data, can be distinguished. To see this, let us, for example, compare the consumption of those born between 1940-44 with those born between 1935-39. Overlaying the cohort lines as we have done in Figure 11b allows us to compare consumption levels of different cohorts at a particular age. At age 55, for instance, we notice that the 1940-44 cohort has a higher consumption than the 1935-39 cohort. In the case of these cohorts this result holds for any comparable age. It is more difficult to distinguish these cohort differences at a particular age for the younger cohorts, so we revert to more formal techniques, which are presented in the next section.

Similar patterns are present in the cohort profiles of total earnings. However, both expenditure and earnings profiles shown in Figures 11 and 12 are not adjusted for household size. Figure 13 shows the cohort profiles for per capita expenditures. Cohort and year effects are still noticeable, however the inverted U-shape profile of age has disappeared.

5 Age, Cohort, and Time Effects

The visual patterns discussed in the previous section have been formalized in the literature. More specifically, referring to the work of Deaton (1985, 1997), Deaton and Paxson (1993, 1994), Attanasio and Browning (1995), Attanasio and Szekely (2002), McKenzie (2000, 2002) we identify five broad groups of influences on consumption: lifetime-income effects, cohort effects, life-cycle effects, cyclical effects, and heterogeneity.

The idea that the level, timing, and riskiness of lifetime income may affect the level and timing of consumption over the life-cycle has been extensively discussed (for references see Attanasio and Browning, 1995). The second set of effects is the one common to people born in the same period: the cohort effect. The cohort effect captures the idea that systematic differences in the social environment in which people grow up may well result in different attitudes toward risk, discount factors, and preferences over the lifetime path of consumption. It is entirely possible that people who grew up during before the 1979 Islamic Revolution have different attitudes toward saving or consumption compared to people born after 1979, for instance.

The third set of influences is that of life-cycle effects. One of the most obvious examples is the effect of family composition on consumption: for instance, families with older children spend more. Another set of influences can be related to labor-supply behavior. If, for example, female participation in the labor force means substituting home production with market commodities, there will be an obvious relationship between consumption and labor supply behavior. Female labor-force participation is in turn related to other life-cycle phenomena such as child bearing. Less obvious might be pure age effects, e.g. people having a big birthday or wedding party, so we should see a small "blip" in consumption at that

age (Attanasio and Browning, 1995).

The fourth set of influences is that of cyclical or time effects. These are effects that are common to all agents in the same time period. The most obvious of examples are movements in common variables like prices or interest rates. Although common, we must allow that the effects differ across households and across cohorts (Attanasio and Browning, 1995). For example, an interest rate shock has a different effect for indebted families than for wealthy ones. Similarly, an increase in the price level has different effect for wealthy households than for poor households.

The final feature of any micro data is the large heterogeneity evident in the level of consumption by families that are identical in all other observable characteristics. For a discussion of parameter heterogeneity please see McKenzie (2000).

For the decomposition of consumption changes into age, cohort, and time effects we follow the approach proposed by Deaton (1994, 1997). These types of decompositions are based on models and are certainly not free of structural assumptions; they assume away interaction effects between age, cohort, and years, so that, for example the shape of age profiles is unaffected by changes in their position, and the appropriateness and usefulness of the assumption has to be judged on a case-by-case basis. In our case, we want to decompose consumption or earnings, hence we attribute growth to age and cohort effects, and use the year effects to capture cyclical fluctuations or business-cycle effects that average to zero over the long run. According to Deaton(1997) nineteen years should be a sufficient for trend and cycle to be separated with confidence.

We first consider the case of lifetime consumption profile. If the growth in living standard acts so as to move up the consumption-age profiles proportionately, it makes sense to work in logarithms, and to write the the logarithm of consumption as

$$\ln c_{ct} = \beta + \alpha_a + \gamma_c + \psi_t + u_{ct} \tag{1}$$

where the subscripts c and t refer to cohort and time (year), and a refers to age, defined here as the age of cohort c in year t. In this particular case, (1) can be given a theoreti-

cal interpretation, since according to life-cycle theory under certainty, consumption is the product of lifetime wealth, the cohort aggregate of which is constant over time, and an age effect, which is determined by preferences.

To implement a model like the one in (1) we need to label the cohorts. We label cohorts as the age in year $t = 0$. This way c is just a number like a and t. We can then choose to restrict the age, cohort, and year effects in (1) in various different ways. In particular, we can choose polynomials or dummies. For the year effects, where there is no obvious pattern a priori, dummy variables would be necessary. Age effects on the other hand could be modeled as cubic, quartic, or quintic polynomials, and cohort effects might even be handled as linear in c. However, as Deaton (1997) points out, if the data are plentiful, as is the case with Iran, there is no reason not to use dummy variables for all three sets of effects, and thus to allow the data to choose any pattern.

Suppose that A is matrix of age dummies, C is a matrix of cohort dummies, and Y is a matrix of year dummies. The cohort data are arranged as cohort-year pairs, with each observation corresponding to a single cohort in a specific year. If there are m such cohort-year pairs, the three matrices will each have m rows; the number of columns will be the number of ages (or age groups), the number of cohorts, and the number of years, respectively. The model (1) can then be written in the form

$$y = \beta + A\alpha + C\gamma + Y\psi + u \tag{2}$$

where y is the stacked vector of cohort-year observations–each row corresponds to a single observation on a cohort–on the cohort means of the logarithm of consumption. As usual, we must drop one column from each of the three matrices, since for the full matrices, the sum of the columns is a column of ones, which is already included in the constant term.

However, it is still impossible to estimate (2) because there is an additional linear relationship across the three matrices. The problem lies in the fact that if we know the date, and we know when a cohort was born, then we can infer the cohort's age. Since c is the age of the cohort in year 0, we have

$$a_{ct} = c + t \tag{3}$$

which implies that the matrices of dummies satisfy

$$As_a = Cs_c + Ys_y \tag{4}$$

where the s vectors are arithmetic sequences $\{0, 1, 2, 3, ..., \}$ of the length given by the number of columns of the matrix that premultiplies them.

The normalization of age, cohort, and year effects has been discussed in different contexts by a number of authors, particularly by Hall (1971), who provides a clear account in the context of embodied and disembodied technical progress for different vintages of pick-up trucks, and by Weiss and Lillard (1978), who are concerned with age, vintage, and time effects in the earnings of scientists. The treatment here is similar to Hall's, but is based on that given by Deaton and Paxson (1994). First, in (2) we can replace the parameter vectors α, γ, and ψ by

$$\alpha = \alpha + \kappa s_a, \quad \gamma = \gamma + \kappa s_c, \quad \psi = \psi - \kappa s_y \tag{5}$$

for any scalar constant κ, and by (4) there will be no change in the predicted value of y.

Deaton (1997) suggests attributing growth to age and cohort effects, and to use the year effects to capture cyclical fluctuations over the business-cycle effects that average to zero over the long run. A normalization that accomplishes this makes the year effects orthogonal to a time-trend, so that using the previous notation we have

$$s_y^{'}\psi = 0. \tag{6}$$

The simplest way to estimate (2) subject to the normalization (4) is to regress y on (a) dummies for each cohort excluding (say) the first, (b) dummies for each age excluding the first, and (c) a set of $T - 2$ year dummies defined as follows from $t = 3, ..., T$

$$d_t^* = d_t - [(t-1)d_2 - (t-2)d_1] \tag{7}$$

where d_t is the usual year dummy, equal to 1 if the year is t and 0 otherwise. This procedure enforces the restriction (6) that the year dummies add to zero. The coefficients of the d_t^* give the third through final year coefficients; the first and second can be recovered from the fact that all year effects add to zero and satisfy (6).

Figures 14-16 show the decomposition of the total expenditures and earnings, as well as per capita expenditures into age, cohort, and year effects. The top-right panel of each figure shows the estimated age effects. According to this, total and per capita expenditures and earnings are a concave function of the age of the household head. The peak of both earnings and expenditures is reached during the early fifties after which they start to decline.

The cohort effects are shown in the bottom-left panel of each figure. Age in 1984 is the cohort measure; thus, the earlier you were born, the older you are in 1984. With the exception of the youngest cohorts (age 30 or less in 1984), there is a strong downward trend going from younger cohorts to the older ones. Cohort effects remain very similar even when we control for household size, i.e. using per capita consumption. The implication of this is that older cohorts have fared worse during the post revolution transition, when we control for the age and time effects. This is something that we expect as, in general, the younger generation is driving economic development. In Iran, in particular, this might be the case partially due to the effects of the revolution. People already in their middle-age during the revolution may have found their professional skills obsolete or their connections gone, which may have affected their ability to take advantage of the new political system.

The bottom right panel of each figure displays the year effects, which, by construction, pick up the aggregate trends in the economy. We can clearly distinguish the war years in which expenditures and earnings decline significantly until 1989, the recovery after the war which continues until 1994, and the major economic decline in 1995.

6 Concluding Remarks

This paper has provided an alternative way of considering changes in the welfare of Iranian households as measured by changes in consumption, earnings, and household size. The

typical description of macro events uses aggregate data from national accounts. Instead, we utilize the Household Expenditure and Income Surveys from 1984 to 2002. Additionally, due to the fact that consumption, earnings, and household formation depend on the age of the person, when he was born, and what particular year we are looking at, we consider the evolution of consumption and earnings of cohorts of individuals or households. By grouping individuals or households into cohorts, as opposed to aggregating all of them, we are able to obtain separate age, cohort, and time profiles. The time effects pick up the trends noticeable in the macro data, whereas the age profiles show the typical inverted U-shape. The cohort profiles show that, after taking into account the age of head of the household and year of survey, the younger generation in Iran has fared better than the older generation in the post-revolution transition.

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Table 1: Iran macro and demographic indicators

Year	GDP per capita growth (annual %)	Final consumption expenditure, etc. (annual % growth)	Household final consumption expenditure (annual % growth)	Household final consumption expenditure per capita growth (annual %)	Subsidies and other current transfers (% of total expenditure)	Inflation, consumer prices (annual %)	Birth rate, crude (per 1,000 people)	Population growth (annual %)	Labor force, female (% of total labor force)
1980	-15.8	-5.6	1.8	-1.7	19.4	20.6	43.6	3.6	20.4
1981	-6.4	5.2	7.5	3.7	18.3	24.2	n.a.	3.6	20.5
1982	10.8	10.9	15.4	11.3	16.6	18.7	44.0	3.7	20.6
1983	9.0	9.6	12.1	8.0	16.6	19.7	n.a.	3.8	20.6
1984	-3.2	0.0	1.7	-2.1	18.0	12.5	n.a.	3.9	20.7
1985	-2.2	5.1	5.1	1.1	13.2	4.4	40.4	3.6	20.8
1986	-12.3	-9.4	-6.7	-9.9	12.9	18.4	n.a.	3.2	20.9
1987	-3.1	-3.1	-2.3	-5.4	15.9	28.6	38.0	2.9	21.0
1988	-7.1	-3.0	-3.4	-6.2	21.2	28.7	n.a.	2.5	21.0
1989	1.9	1.9	5.3	2.7	19.0	22.4	n.a.	2.2	21.1
1990	8.8	9.0	8.4	6.1	22.2	7.6	30.8	1.6	21.2
1991	8.9	9.3	9.4	7.7	17.3	17.1	n.a.	1.6	21.8
1992	4.4	3.0	2.3	0.6	25.2	25.8	26.0	1.6	22.4
1993	0.5	4.6	2.4	0.7	16.9	21.2	n.a.	1.6	23.0
1994	-0.7	2.6	2.2	0.6	13.0	31.5	n.a.	1.6	23.6
1995	1.2	-3.4	-4.8	-6.3	15.1	49.7	23.7	1.6	24.2
1996	3.9	10.1	11.0	9.3	13.5	28.9	n.a.	1.7	24.8
1997	1.7	3.1	2.7	1.1	14.3	17.4	22.1	1.6	25.4
1998	0.4	1.5	2.5	0.9	12.5	17.9	n.a.	1.5	25.9
1999	1.0	4.0	3.2	1.7	10.0	20.1	n.a.	1.4	26.5
2000	4.4	3.5	3.1	1.6	10.3	14.5	22.1	1.4	27.1
2001	3.4	4.3	6.7	5.3	n.a.	11.3	22.1	1.7	27.8

Source: World Bank Data 2003

Table 2: Number of households and individuals

Year	Households	Individuals
1984	27,148	144,062
1985	27,261	171,165
1986	5,760	36,683
1987	5,766	37,097
1988	7,837	51,307
1989	11,520	75,303
1990	18,454	101,568
1991	18,673	102,827
1992	18,671	100,093
1993	12,770	66,245
1994	19,909	104,370
1995	36,578	193,649
1996	21,964	113,827
1997	21,950	111,735
1998	17,477	89,035
1999	27,464	139,841
2000	26,941	132,708
2001	26,961	130,965
2002	32,152	153,114

Table 3a: Cell sizes for selected 1-year cohorts

Age in 1984	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Mean
20	110	217	47	73	107	201	308	334	441	254	541	772	577	500	432	730	667	684	830	412
25	561	637	141	149	177	369	469	471	453	290	695	961	609	626	440	882	668	763	796	535
30	815	613	142	178	189	383	433	461	486	247	619	805	550	490	390	768	549	583	717	496
35	761	572	116	108	137	309	298	405	329	213	503	644	389	425	294	566	398	446	509	391
40	689	459	138	103	121	271	305	310	297	181	451	547	385	311	243	455	364	339	464	339
45	686	420	105	122	85	268	279	329	274	215	374	507	285	290	223	548	300	360	441	322
50	736	505	109	87	153	272	340	318	296	201	537	501	372	352	281	526	275	402	405	351
55	588	418	80	96	105	271	266	315	280	164	400	421	255	251	146	452	248	290	312	282
60	794	428	100	89	114	262	199	261	216	115	317	316	206	167	114	285	204	161	194	239
65	430	209	43	30	41	169	91	125	96	55	147	129	58	78	37	131	45	52	61	107
70	287	108	33	17	14	63	61	37	46	18	88	59	43	18	8	50	18	14	17	53
75	171	73	13	17	10	73	28	32	17	16	39	26	10	7	8	29	7	3	7	31

Table 3b: Cell sizes for 5-year cohorts

Age in 1984	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Mean
15	277	512	121	150	237	373	759	869	1,526	1,049	1,740	3,418	2,426	2,645	2,105	3,307	3,395	3,257	3,939	1690
20	1,234	2,154	467	563	770	1,115	1,942	1,969	2,423	1,625	2,623	4,805	3,083	3,007	2,343	3,707	3,634	3,619	4,315	2389
25	2,948	3,671	745	824	1,047	1,557	2,527	2,492	2,466	1,686	2,786	5,033	2,843	2,928	2,291	3,635	3,510	3,369	3,941	2647
30	3,300	3,349	717	760	1,033	1,444	2,299	2,279	2,200	1,459	2,424	4,369	2,514	2,331	1,840	2,907	2,669	2,699	3,155	2303
35	2,671	2,714	574	548	767	1,108	1,748	1,772	1,563	1,053	1,731	3,073	1,835	1,864	1,463	2,126	1,966	2,009	2,335	1733
40	2,520	2,376	499	496	694	953	1,584	1,619	1,495	1,030	1,694	2,862	1,689	1,581	1,217	1,920	1,902	1,848	2,211	1589
45	2,824	2,638	571	599	694	1,153	1,768	1,784	1,618	1,133	1,656	3,157	1,763	1,709	1,436	2,241	2,097	2,072	2,425	1755
50	2,959	2,681	571	507	766	1,122	1,843	1,859	1,681	1,227	1,820	3,207	1,806	1,656	1,353	1,974	1,744	1,903	2,139	1727
55	2,730	2,515	519	499	689	1,026	1,625	1,615	1,421	956	1,304	2,445	1,278	1,253	1,007	1,512	1,352	1,286	1,420	1392
60	2,482	2,165	446	382	541	763	1,098	1,149	995	677	889	1,624	820	744	530	873	757	680	755	967
65	1,199	1,036	205	176	248	409	500	502	392	311	320	604	277	260	184	300	185	193	224	396
70	775	566	140	77	115	177	276	288	226	130	184	293	154	101	67	128	102	69	85	208

Table 4: Household Composition and Headship

Table 4a: Distribution of sample surveyed by relation to the household head

1984

Percentage of Age Group by Relation to Head

Age	Head or Spouse	Child	Child-in-law	Grandchild	Parent	Other	Number in Sample
15-19	8.0	80.8	4.3	0.7	0.0	6.2	16,350
20-24	39.1	49.2	5.8	0.2	0.0	5.8	10,572
25-29	74.2	20.1	2.7	0.0	0.0	3.0	8,902
30-34	90.8	6.4	1.1	0.0	0.1	1.6	7,353
35-39	94.6	2.8	0.5	0.0	0.4	1.6	5,781
40-44	95.8	1.3	0.3	0.0	1.3	1.3	5,184
45-49	95.9	0.5	0.2	0.0	2.3	1.1	5,329
50-54	92.8	0.3	0.1	0.0	5.2	1.7	5,338
55-59	89.6	0.2	0.0	0.0	8.5	1.7	4,594
60-64	83.2	0.2	0.0	0.0	13.8	2.8	4,201
65-69	78.3	0.1	0.0	0.0	17.7	3.9	1,990
70-74	68.1	0.1	0.1	0.1	24.3	7.5	1,449
75+	57.6	0.1	0.1	0.0	34.2	8.0	2,447

1985

Percentage of Age Group by Relation to Head

Head or Spouse	Child	Child-in-law	Grandchild	Parent	Other	Number in Sample
11.53	77.96	4.28	0.66	0.01	5.57	15,900
45.6	44.0	5.5	0.1	0.0	4.8	10,763
79.2	16.0	2.2	0.0	0.0	2.6	9,248
91.9	5.6	1.0	0.0	0.1	1.5	7,723
95.6	2.3	0.5	0.0	0.3	1.3	5,851
96.4	1.2	0.2	0.0	1.3	1.0	4,784
95.9	0.5	0.1	0.0	2.6	0.9	4,851
93.8	0.2	0.1	0.0	4.8	1.1	5,041
90.0	0.1	0.0	0.0	8.2	1.7	4,012
83.7	0.1	0.0	0.0	13.5	2.7	4,052
79.5	0.1	0.1	0.0	16.9	3.5	1,986
67.5	0.2	0.0	0.0	26.2	6.2	1,249
58.0	0.1	0.0	0.0	33.8	8.2	1,974

2001

Percentage of Age Group by Relation to Head

Age	Head or Spouse	Child	Child-in-law	Grandchild	Parent	Other	Number in Sample
15-19	2.07	92.57	1.94	0.99	0.01	2.42	19,602
20-24	18.8	72.3	4.8	0.4	0.0	3.7	13,093
25-29	53.7	39.5	3.8	0.1	0.0	2.9	9,240
30-34	82.9	13.7	1.9	0.0	0.0	1.4	8,101
35-39	93.7	4.6	0.8	0.0	0.1	0.8	7,302
40-44	96.3	2.3	0.4	0.0	0.5	0.5	7,053
45-49	97.7	0.8	0.1	0.0	0.9	0.4	5,631
50-54	96.4	0.6	0.0	0.0	2.4	0.6	4,249
55-59	95.9	0.2	0.1	0.0	3.5	0.4	3,320
60-64	92.0	0.1	0.0	0.0	7.0	0.9	3,301
65-69	90.3	0.0	0.0	0.0	8.7	1.0	3,021
70-74	86.4	0.0	0.0	0.0	11.5	2.0	2,445
75+	74.0	0.0	0.0	0.0	22.0	4.0	2,327

2002

Percentage of Age Group by Relation to Head

Head or Spouse	Child	Child-in-law	Grandchild	Parent	Other	Number in Sample
2.0	92.7	1.9	1.0	0.0	2.5	23,323
16.8	74.5	5.1	0.4	0.0	3.2	15,904
51.3	42.2	3.7	0.1	0.0	2.7	10,898
82.3	14.5	1.7	0.0	0.0	1.5	9,630
93.3	4.8	0.7	0.0	0.1	1.0	8,505
96.4	2.2	0.3	0.0	0.5	0.6	8,395
97.3	1.1	0.2	0.0	1.0	0.5	7,018
97.1	0.4	0.1	0.0	2.0	0.6	5,450
95.6	0.1	0.0	0.0	3.5	0.8	3,820
92.2	0.1	0.1	0.0	6.7	1.0	3,855
90.6	0.1	0.0	0.0	8.1	1.3	3,577
84.9	0.0	0.0	0.0	12.7	2.4	2,931
75.0	0.0	0.0	0.0	21.4	3.6	3,034

Source: Author's calculations from Household Expenditure and Income Surveys

Table 4b:Changes in household structure

Age	Percentage of age group who are household heads																		
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-19	1.7	2.3	2.1	1.9	1.4	0.7	0.7	0.5	1.1	0.7	0.4	0.3	0.5	0.5	0.4	0.3	0.3	0.3	0.3
20-24	11.7	15.5	11.9	13.0	11.0	8.5	8.0	6.8	10.0	8.1	6.4	6.0	6.6	6.4	4.6	4.3	4.5	4.4	4.2
25-29	33.1	37.7	33.3	33.6	31.0	29.5	27.9	25.9	31.1	28.2	26.4	24.9	27.0	26.8	25.3	22.5	24.4	21.4	19.5
30-34	44.9	45.3	42.9	48.3	44.0	43.5	43.5	42.6	44.4	43.2	41.9	41.8	42.4	41.4	41.1	41.3	41.4	39.7	39.7
35-39	46.2	47.7	49.5	45.9	49.0	48.9	48.9	48.2	48.7	47.9	48.6	47.8	48.4	48.9	46.3	46.5	46.7	47.1	46.7
40-44	48.6	49.4	49.8	50.0	51.3	49.5	48.9	48.9	50.2	50.5	51.7	50.9	49.6	50.3	51.5	50.8	51.1	50.7	51.1
45-49	53.0	53.2	52.6	54.0	51.6	50.1	52.2	52.2	50.1	48.6	49.7	51.5	50.9	51.9	49.7	51.6	53.6	53.3	51.9
50-54	55.4	56.5	55.0	57.0	54.0	54.5	52.9	52.0	53.1	54.0	53.9	54.0	54.1	53.6	53.3	51.7	51.5	52.3	52.8
55-59	59.4	57.4	58.2	59.5	59.0	59.3	59.1	58.6	57.7	59.1	59.9	57.9	56.6	57.0	55.3	54.9	56.1	54.6	56.4
60-65	59.1	59.8	60.1	61.5	60.2	59.3	60.5	60.1	59.3	60.8	61.4	59.4	60.8	61.0	60.8	60.2	59.8	59.5	58.5
65-69	60.3	62.4	59.3	57.5	63.2	63.4	62.2	65.0	61.9	64.6	64.4	62.5	63.2	61.2	64.9	63.7	64.6	64.8	64.9
70-74	53.5	54.6	54.0	54.1	58.3	64.5	65.2	64.0	62.9	64.7	62.6	64.7	64.0	66.1	67.1	63.9	65.8	67.5	67
75+	49.8	50.7	49.1	46.8	55.6	52.4	53.6	56.7	56.6	57.4	55.4	59.0	58.6	58.9	57.8	61.2	63.5	64.5	65.6
group	Percentage of age group who are a child of head																		
0-4	92.3	93.0	90.3	91.5	90.2	90.0	90.5	89.8	91.4	91.8	90.1	89.6	89.7	89.1	88.5	88.3	89.7	88.1	88
5-9	95.6	95.6	94.5	95.3	94.7	94.9	95.2	95.2	95.3	96.1	95.9	95.5	95.1	95.6	94.9	95.3	95.4	94.7	95.2
10-14	94.2	94.7	94.3	94.8	95.0	95.7	95.4	95.8	95.5	96.4	96.4	96.2	95.9	96.1	96.2	96.3	96.7	96.7	96.7
15-19	80.8	78.0	80.4	80.8	83.0	86.2	85.9	87.3	84.9	88.9	89.9	90.4	89.3	90.1	91.1	91.6	92.1	92.6	92.7
20-24	49.2	44.0	45.5	46.6	48.4	56.0	56.4	60.5	53.0	60.2	62.3	64.7	62.0	62.4	67.4	70.5	70.0	72.3	74.5
25-29	20.1	16.0	20.0	17.7	19.3	23.0	24.4	26.7	23.6	26.4	29.1	29.9	28.8	30.1	34.1	36.1	35.1	39.4	42.2
30-34	6.4	5.6	7.1	5.0	7.0	7.7	7.4	8.4	8.2	8.8	8.8	9.6	9.7	10.2	11.3	11.6	11.6	13.7	14.5
35-39	2.8	2.3	2.9	2.6	3.0	3.4	2.9	3.1	3.2	3.6	3.5	3.6	3.9	4.0	4.6	4.4	4.2	4.6	4.8
40-44	1.3	1.2	2.5	1.2	1.9	1.4	1.5	1.8	1.6	1.7	1.9	1.5	1.6	1.9	2.1	2.0	1.8	2.3	2.2
45-49	0.5	0.5	0.7	0.5	0.8	0.7	0.5	0.8	0.8	1.0	0.7	0.9	0.8	0.7	0.9	0.9	1.3	0.8	1.1
50-54	0.3	0.2	0.4	0.2	0.4	0.5	0.4	0.6	0.4	0.6	0.4	0.5	0.5	0.2	0.3	0.5	0.3	0.6	0.4
55-59	0.2	0.1	0.1	0.2	0.3	0.0	0.4	0.2	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.1
	Percentage of age groups who are a parent, grandchild, or other relative of the head																		
0-4	7.7	7.0	9.7	8.5	9.7	10.0	9.5	10.1	8.5	8.1	9.8	10.4	10.3	10.9	11.5	11.7	10.3	11.9	12
5-9	4.4	4.3	5.5	4.7	5.3	5.0	4.8	4.7	4.6	3.8	4.1	4.5	4.9	4.4	5.1	4.7	4.6	5.3	4.8
10-14	5.6	4.8	5.5	5.0	4.9	4.2	4.5	4.1	4.4	3.5	3.5	3.8	4.1	3.9	3.8	3.7	3.3	3.3	3.3
15-19	11.2	10.5	11.2	10.5	10.6	9.4	9.8	9.3	9.0	6.7	6.9	7.0	7.4	6.6	6.5	6.6	5.7	5.4	5.4
20-24	11.8	10.4	13.7	10.9	12.6	11.4	12.3	12.0	11.4	9.9	10.9	10.8	11.0	10.3	10.5	10.0	9.6	8.9	8.7
25-29	5.8	4.8	5.7	5.4	6.2	6.6	6.3	6.4	5.9	5.5	6.3	6.6	6.8	6.3	6.3	6.6	6.0	6.8	6.5
30-34	2.8	2.6	3.8	2.1	2.7	3.1	3.0	3.4	3.0	1.8	3.1	2.9	3.0	3.0	3.1	3.3	3.3	3.3	3.2
35-39	2.5	2.1	2.3	1.8	2.2	1.8	1.6	1.8	2.1	1.7	1.7	1.8	1.9	1.8	1.6	1.5	1.5	1.7	1.8
40-44	2.9	2.5	2.9	2.4	2.1	1.6	2.3	2.1	2.0	2.2	1.7	1.6	1.7	1.9	1.6	1.3	1.4	1.4	1.4
45-49	3.5	3.7	2.8	4.2	4.1	3.3	2.8	2.4	3.1	3.1	2.4	2.8	2.7	2.5	2.2	2.7	1.7	1.5	1.7
50-54	6.9	6.0	7.1	6.3	5.9	4.6	5.2	5.1	4.9	4.3	3.5	4.1	4.5	3.9	3.4	4.4	3.3	3.0	2.6
55-59	10.2	9.9	9.3	9.8	9.4	7.6	7.6	6.5	8.2	5.2	5.5	5.7	6.5	5.8	4.5	5.6	4.8	3.9	4.3
60-65	16.6	16.2	15.5	16.3	12.5	13.5	13.6	12.2	12.2	9.9	10.2	10.7	10.6	9.9	9.0	8.5	8.8	7.9	7.7
65-69	21.6	20.4	18.5	21.3	20.6	15.5	17.7	14.4	16.3	13.8	14.6	14.1	14.2	13.8	11.2	11.8	10.3	9.7	9.4
70-74	31.9	32.3	29.3	32.2	26.9	21.5	23.0	22.4	21.8	18.7	21.5	19.2	19.3	19.5	17.4	19.3	16.1	13.6	15.1
75+	42.3	42.0	41.1	44.0	34.0	40.6	39.1	36.3	35.6	35.3	36.9	33.0	33.7	33.4	34.3	30.2	27.3	26.0	25

Table 5: Robustness of Consumption to Changes in Headship

	Percentage difference in mean consumption of head vs. consumption of all							
	1984		1985		2001		2002	
Age	*per adult equivalent*	*per capita*	*per adult equivalent*	*per capita*	*per adult equivalent*	*per capita*	*per adult equivalent*	*per capita*
20-24	8.0	7.8	5.4	6.8	15.5	19.7	27.9	32.1
25-29	8.4	9.6	4.7	6.3	7.3	7.4	10.7	11.9
30-34	9.5	11.2	7.5	8.7	5.5	5.8	3.7	3.8
35-39	7.8	7.1	10.5	9.7	0.7	-1.8	4.0	2.1
40-44	6.7	2.8	7.0	3.5	4.0	0.8	4.9	1.7
45-49	3.4	-0.8	3.8	0.4	0.2	-2.3	2.7	0.3
50-54	0.2	-2.9	1.2	-2.2	3.9	1.8	4.4	2.7
55-59	-0.7	-2.7	-2.1	-4.8	0.3	-1.6	0.2	-1.5
60-64	-1.9	-1.7	-1.5	-1.5	3.9	2.8	3.8	2.8
65-69	-4.3	-1.5	-5.3	-3.1	0.5	0.6	1.8	2.0
70-74	-6.6	-1.7	-9.8	-4.8	1.3	2.7	3.9	5.3
75+	-16.2	-9.9	-19.8	-13.8	0.0	3.3	0.6	3.6

Table 6a: Changes in fertility

Head's age	Mean number of children <2																		
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-19	0.28	0.36	0.47	0.52	0.44	0.45	0.09	0.19	0.21	0.18	0.14	0.09	0.16	0.16	0.23	0.11	0.07	0.00	0.04
20-24	0.52	0.53	0.60	0.59	0.52	0.45	0.43	0.38	0.43	0.41	0.36	0.33	0.30	0.35	0.37	0.28	0.28	0.31	0.22
25-29	0.57	0.60	0.59	0.61	0.53	0.54	0.45	0.46	0.44	0.41	0.38	0.37	0.38	0.37	0.35	0.32	0.31	0.29	0.29
30-34	0.52	0.53	0.54	0.51	0.47	0.42	0.41	0.36	0.35	0.32	0.29	0.27	0.27	0.27	0.29	0.27	0.25	0.25	0.24
35-39	0.48	0.47	0.46	0.38	0.41	0.37	0.37	0.31	0.29	0.28	0.21	0.19	0.17	0.18	0.17	0.18	0.18	0.16	0.15
40-44	0.38	0.39	0.36	0.35	0.33	0.32	0.25	0.24	0.22	0.20	0.16	0.13	0.11	0.11	0.10	0.09	0.08	0.08	0.08
45-49	0.31	0.33	0.29	0.29	0.29	0.23	0.22	0.20	0.15	0.15	0.11	0.10	0.08	0.07	0.07	0.07	0.06	0.06	0.06
50-54	0.20	0.23	0.23	0.23	0.22	0.18	0.16	0.15	0.13	0.12	0.09	0.08	0.06	0.06	0.07	0.07	0.05	0.04	0.05
55-59	0.13	0.22	0.22	0.19	0.21	0.16	0.11	0.12	0.10	0.10	0.09	0.08	0.06	0.08	0.06	0.05	0.05	0.04	0.04
60-65	0.11	0.19	0.20	0.22	0.21	0.18	0.10	0.12	0.11	0.10	0.08	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.03

Table 6b: Changes in fertility

Age of Spouse	Mean number of children <2																		
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
15-19	0.58	0.55	0.60	0.57	0.55	0.51	0.53	0.56	0.55	0.47	0.44	0.44	0.47	0.49	0.44	0.38	0.33	0.32	0.37
20-24	0.65	0.65	0.64	0.64	0.60	0.55	0.53	0.49	0.49	0.46	0.39	0.41	0.42	0.41	0.41	0.36	0.35	0.33	0.32
25-29	0.56	0.57	0.52	0.54	0.48	0.46	0.47	0.42	0.40	0.34	0.32	0.31	0.28	0.29	0.30	0.30	0.28	0.25	0.25
30-34	0.48	0.51	0.50	0.42	0.45	0.40	0.41	0.36	0.33	0.29	0.22	0.22	0.20	0.20	0.20	0.19	0.18	0.18	0.18
35-39	0.38	0.41	0.34	0.34	0.34	0.34	0.30	0.29	0.24	0.20	0.16	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09
40-44	0.21	0.23	0.19	0.18	0.20	0.19	0.17	0.16	0.14	0.11	0.09	0.09	0.07	0.05	0.04	0.04	0.04	0.03	0.03
45-49	0.06	0.07	0.08	0.09	0.06	0.06	0.08	0.07	0.06	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Total	0.34	0.37	0.34	0.34	0.32	0.28	0.27	0.24	0.24	0.20	0.17	0.16	0.15	0.15	0.14	0.13	0.12	0.11	0.11

Source: Author's calculations from the HEIS.

Figure 1: Macroeconomic trends 1975-2002

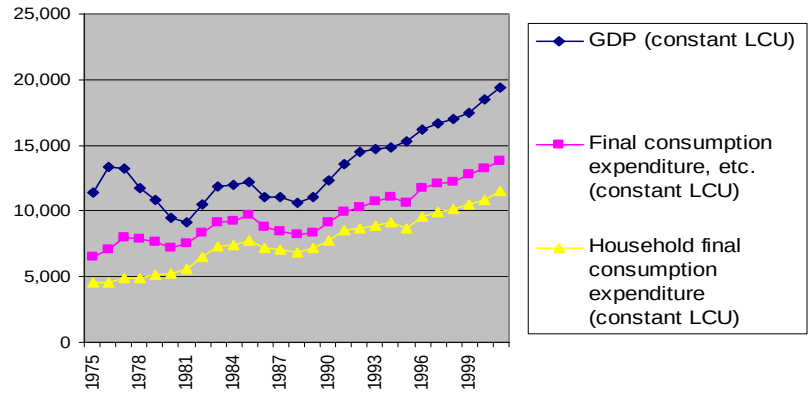


Figure 2: Growth Rates

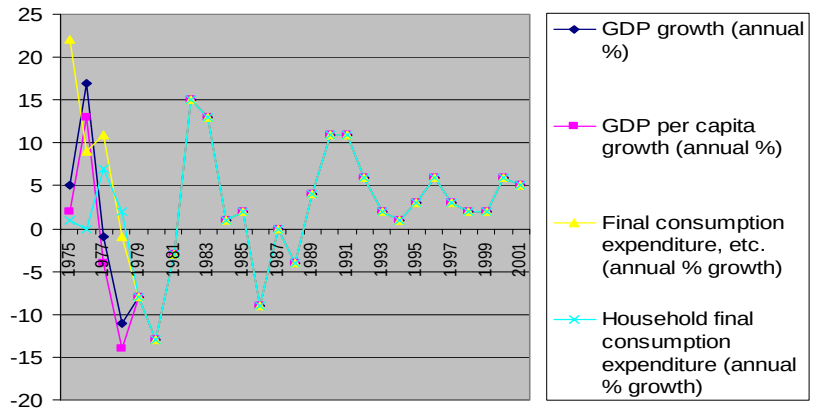
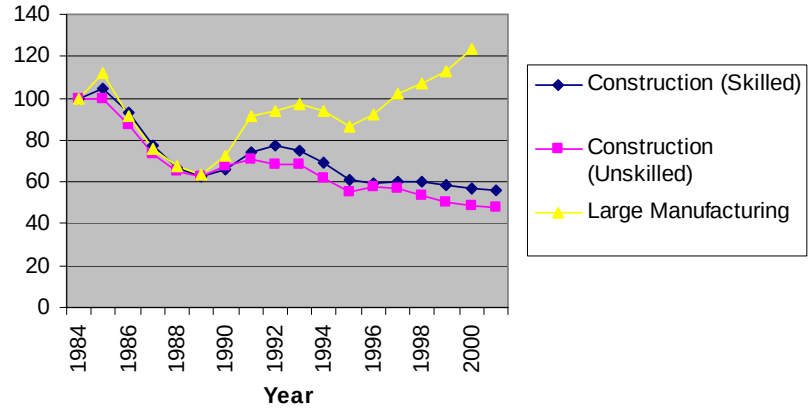


Figure 3: Real Wage Indices (1984=100)



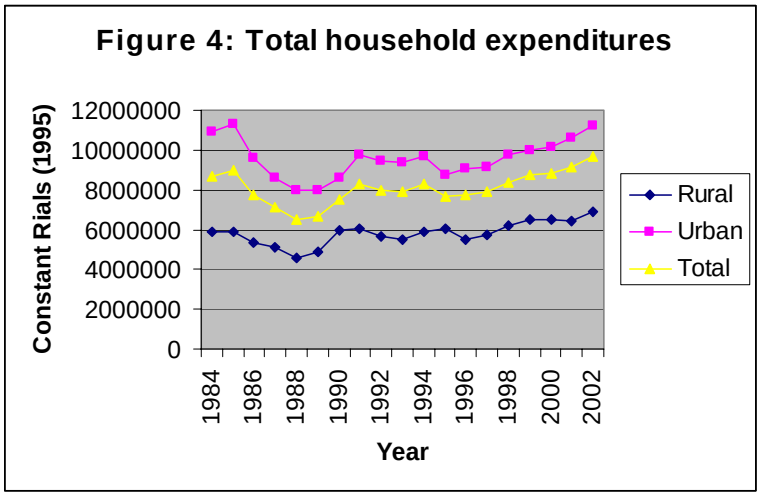


Figure 4: Total household expenditures
Constant Rials (1995)
12000000
10000000
8000000
6000000
4000000
2000000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Rural
Urban
Total

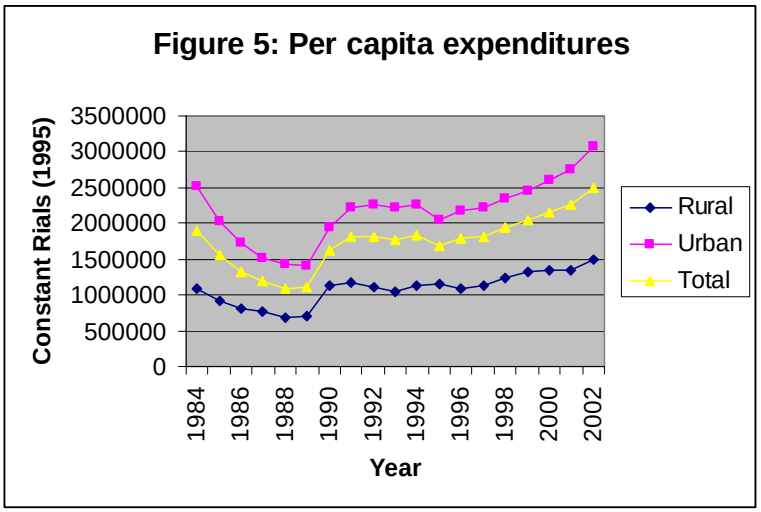


Figure 5: Per capita expenditures
Constant Rials (1995)
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Rural
Urban
Total

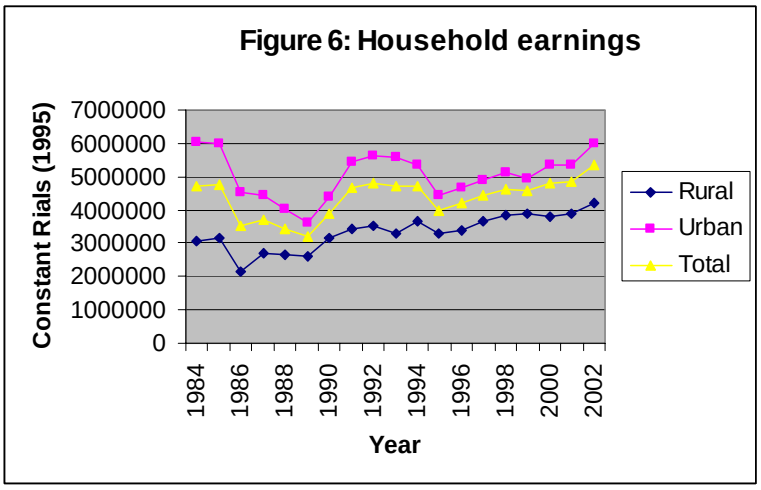


Figure 6: Household earnings
Constant Rials (1995)
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Rural
Urban
Total

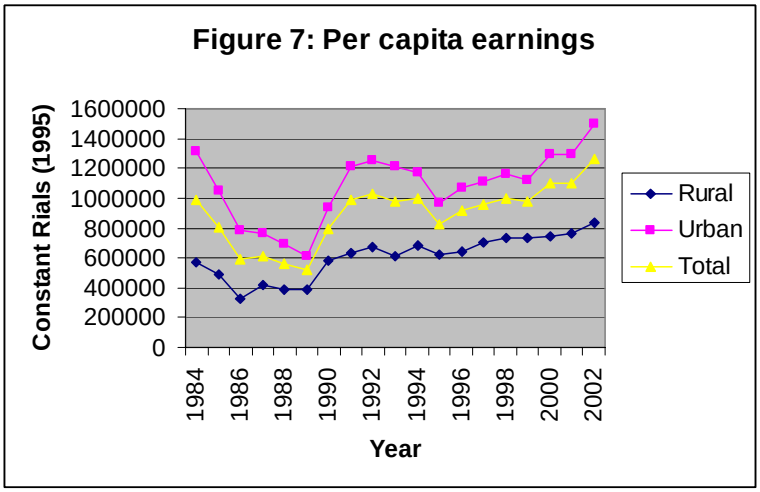


Figure 7: Per capita earnings
Constant Rials (1995)
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Rural
Urban
Total

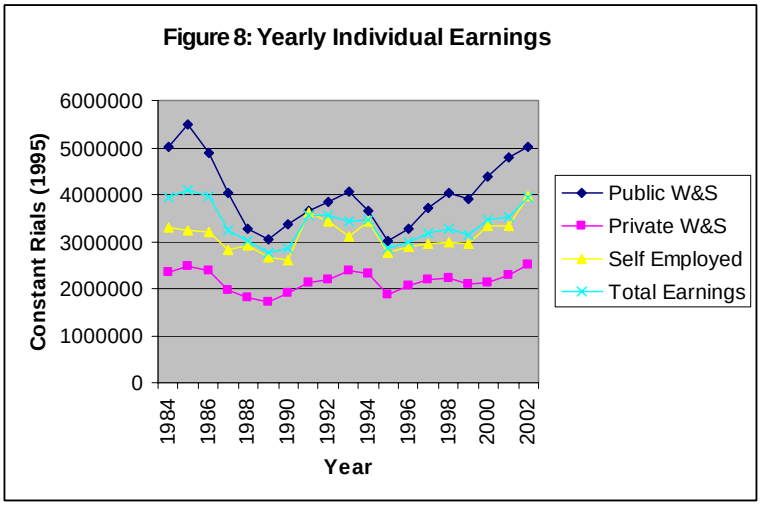
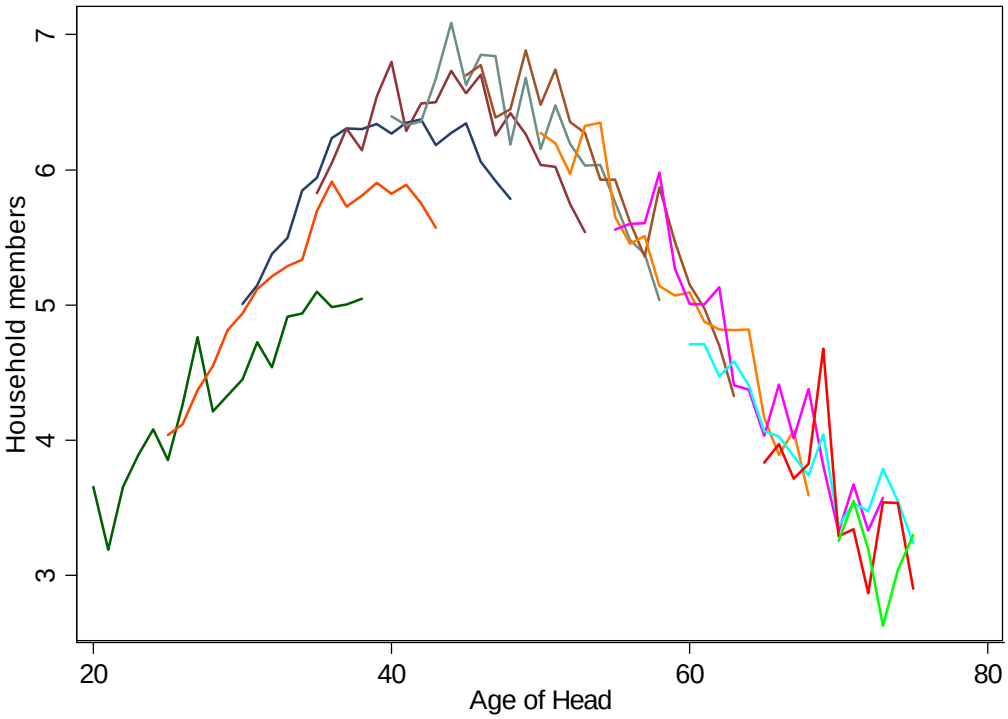


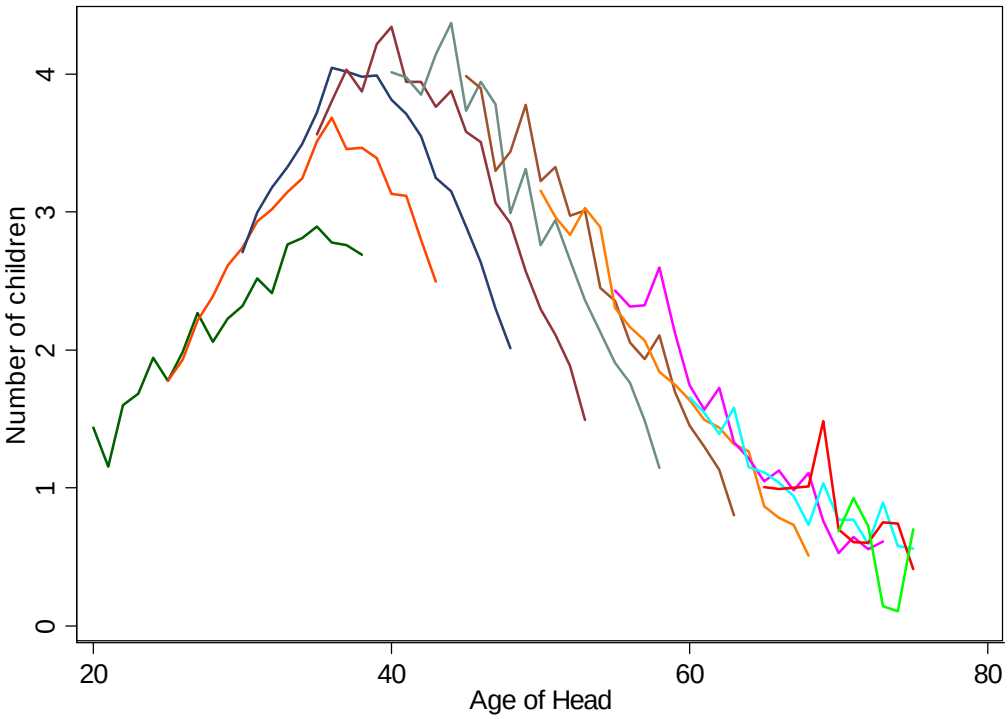
Figure 8: Yearly Individual Earnings
Constant Rials (1995)
6000000
5000000
4000000
3000000
2000000
1000000
0
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Year
Public W&S
Private W&S
Self Employed
Total Earnings

Figure 9: Household size for different birth cohorts



Note: Each line represents average household size for a particular cohort over the 19-year period.

Figure 10a : Number of children in the household for different cohorts



Note: Each line represents average number of children in the household for a particular cohort over the 19-year period.

Figure 10b: Age effects in number of children in the household

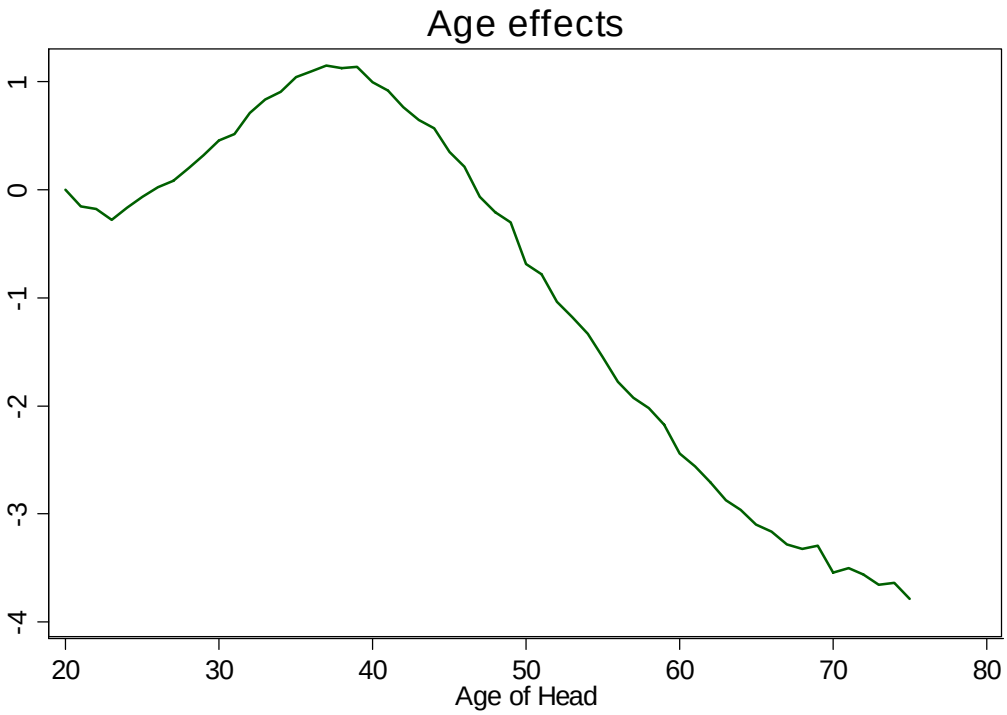


Figure 10c: Cohort effects in the number of children in the household

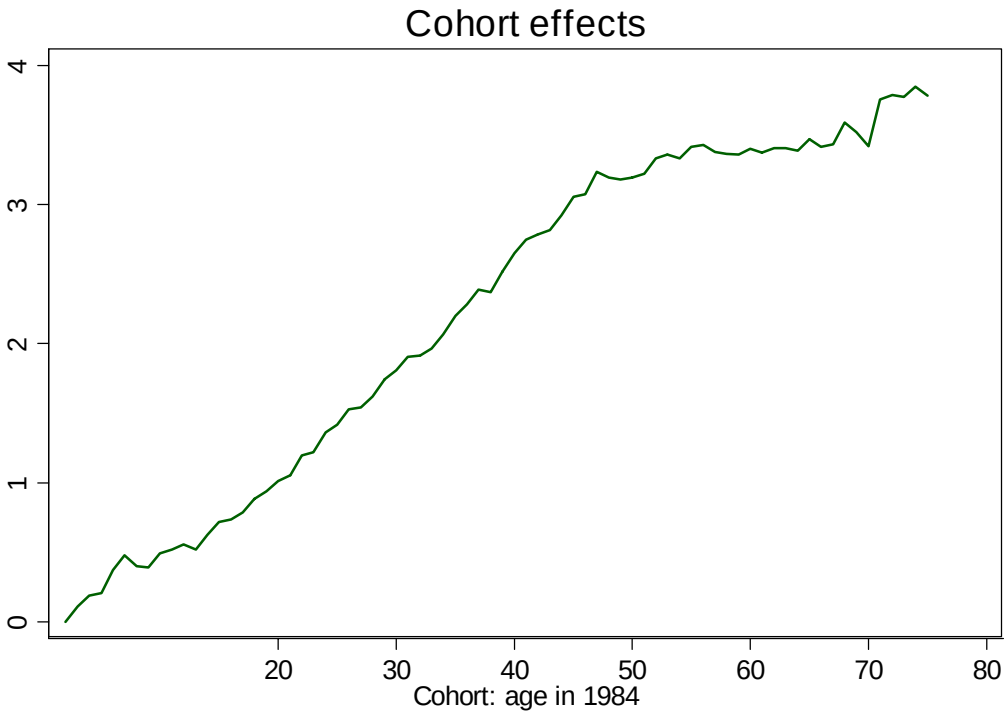


Figure 11a: Household expenditures for every fifth cohort

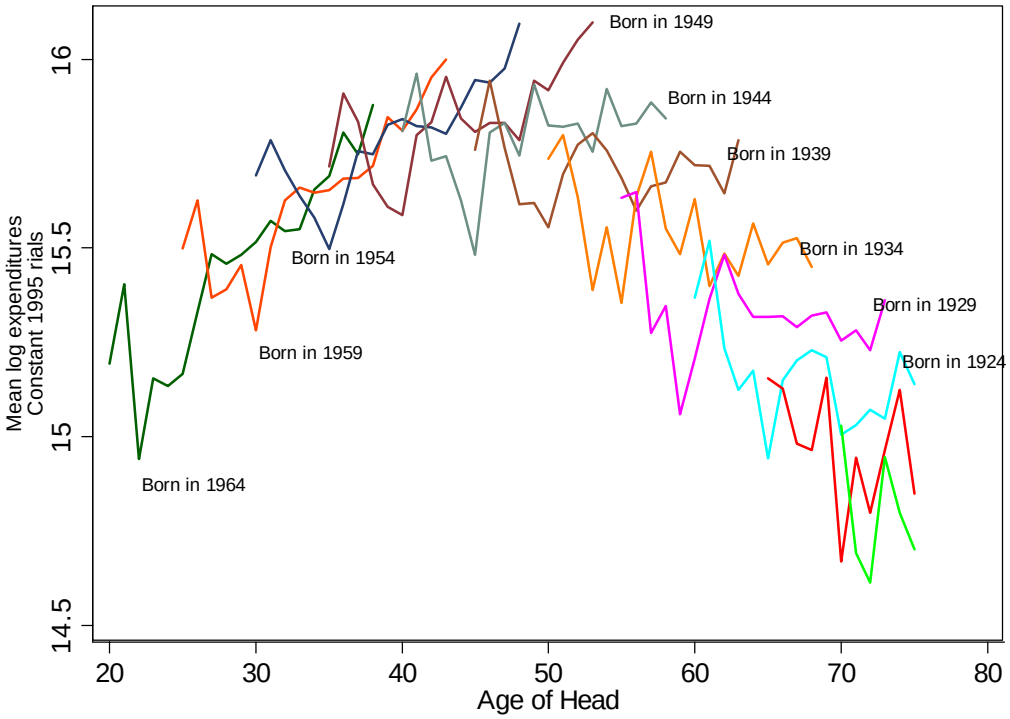


Figure 11b: Total expenditures for 5-year cohorts

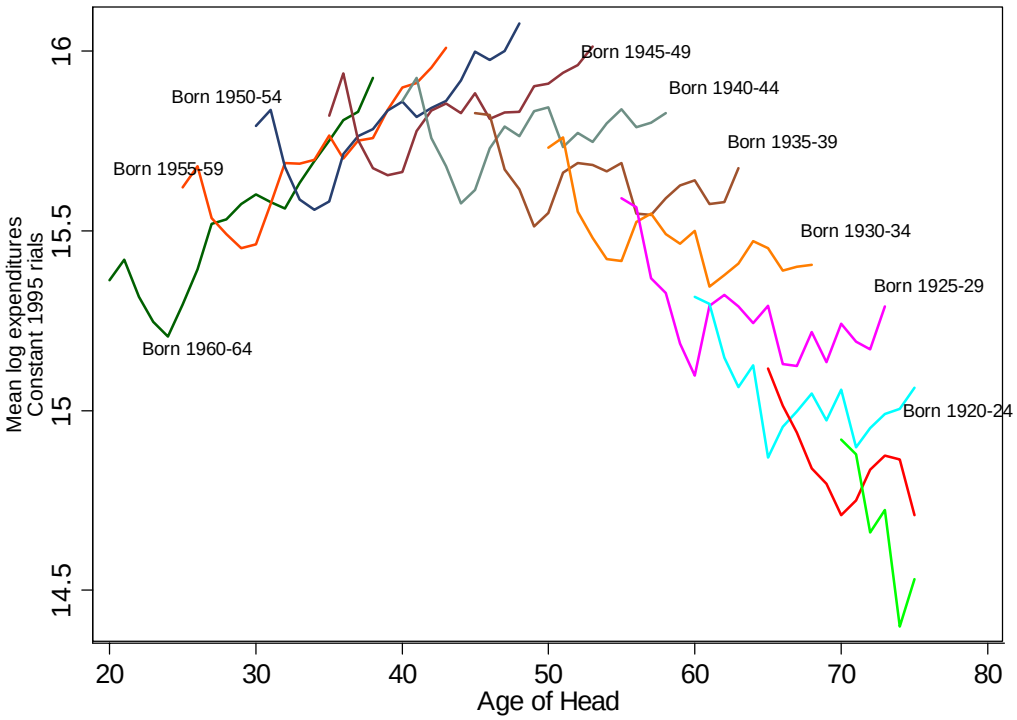


Figure 12a: Total household earnings, by cohort

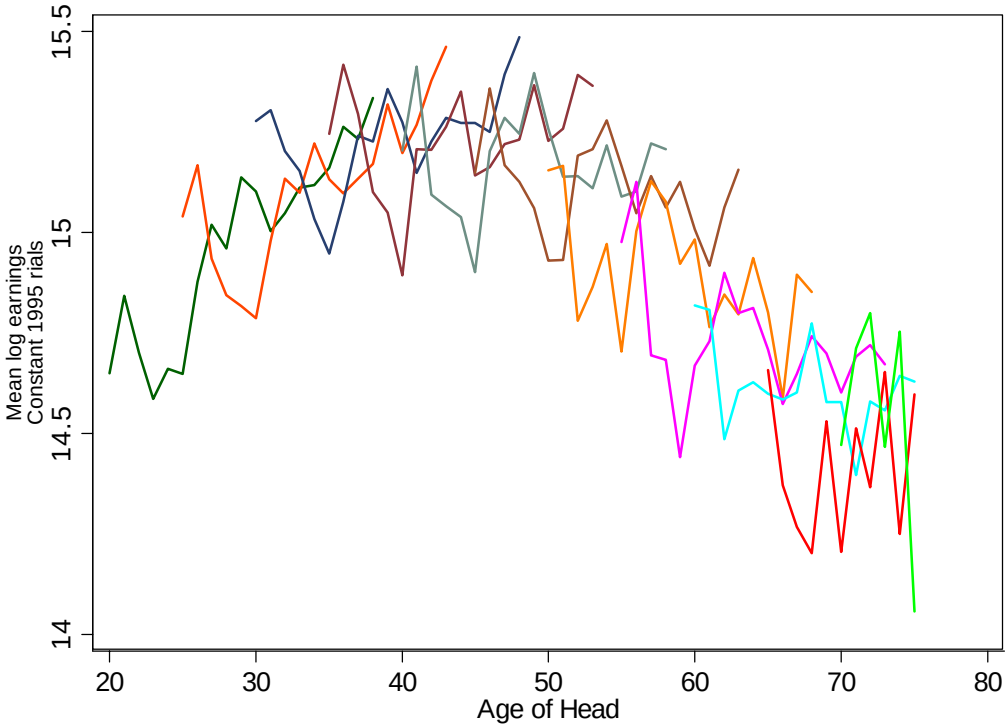


Figure 12b: Total household earnings for 5-year cohorts

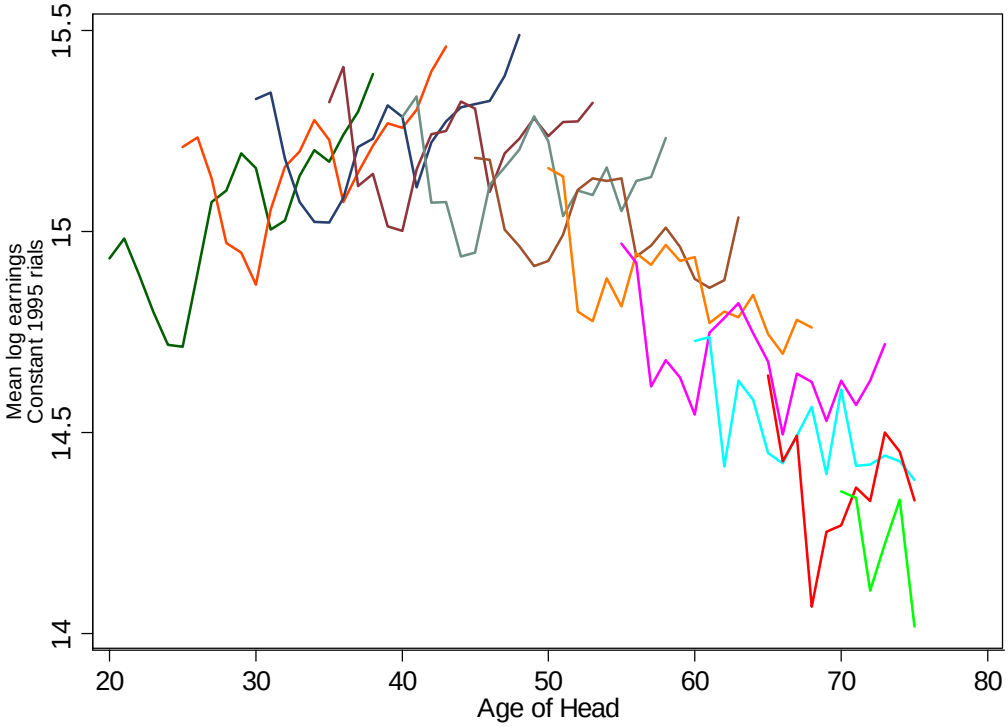


Figure 13a: Per capita expenditures for selected cohorts

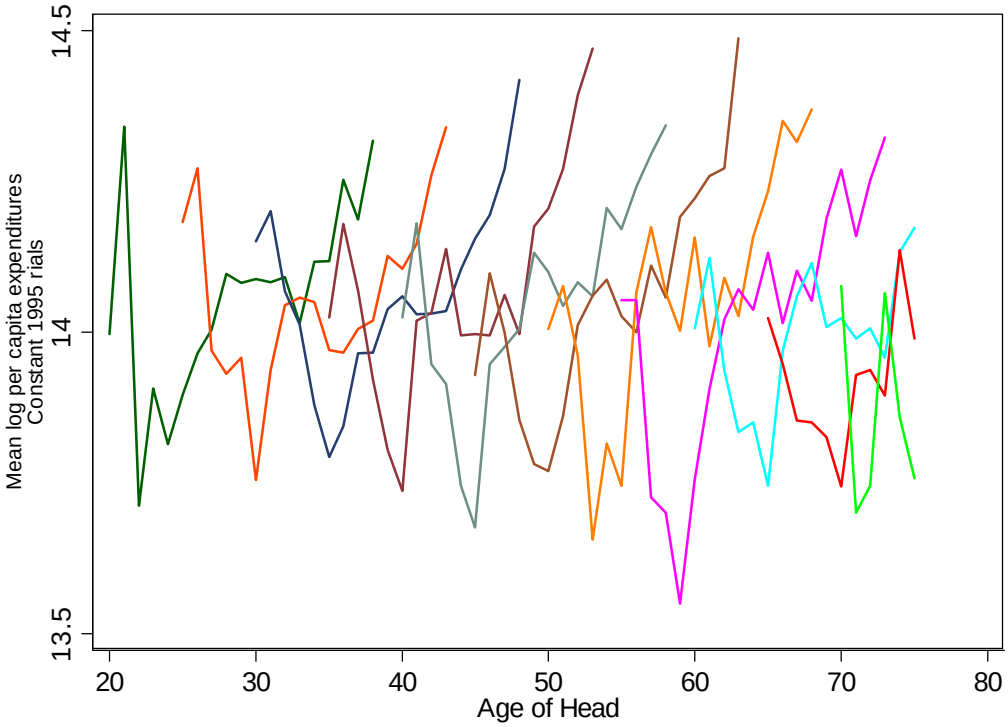


Figure 13b: Per capita expenditures for 5-year cohorts

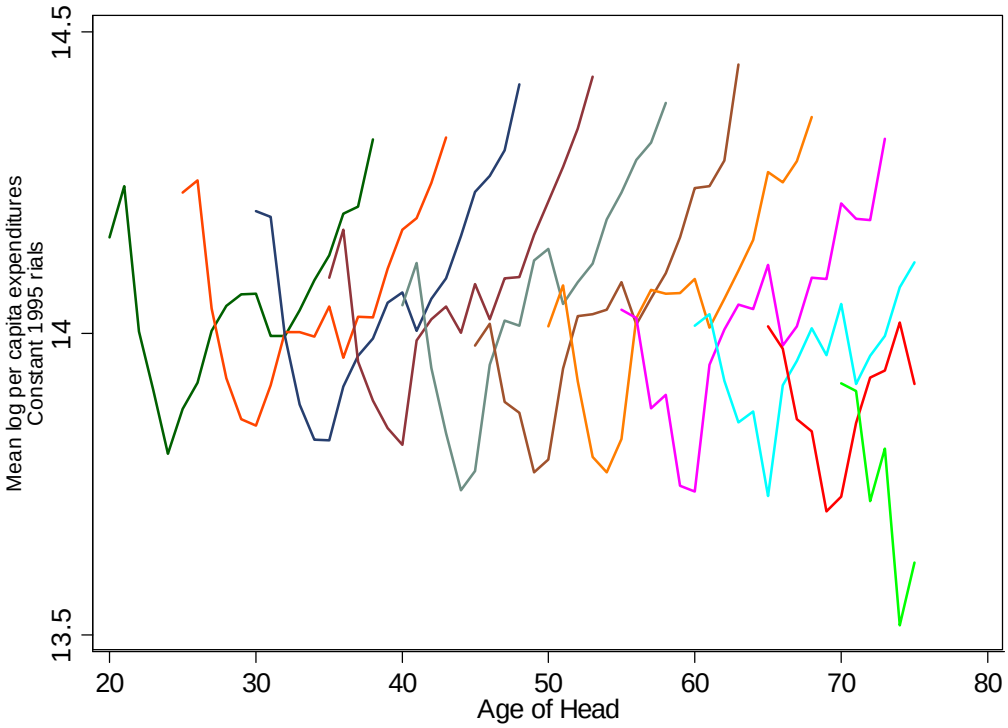
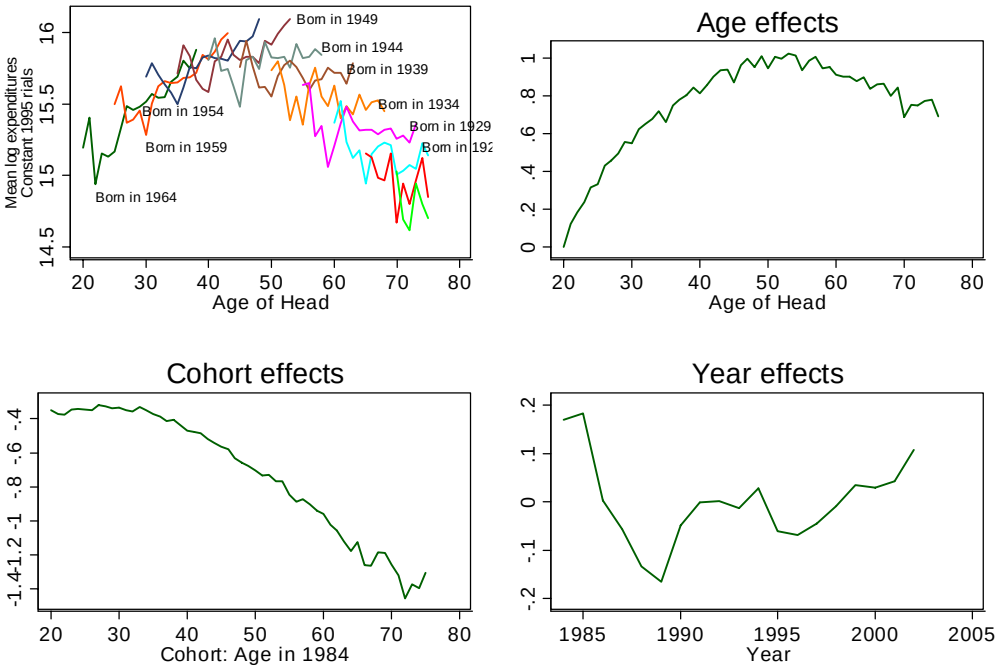
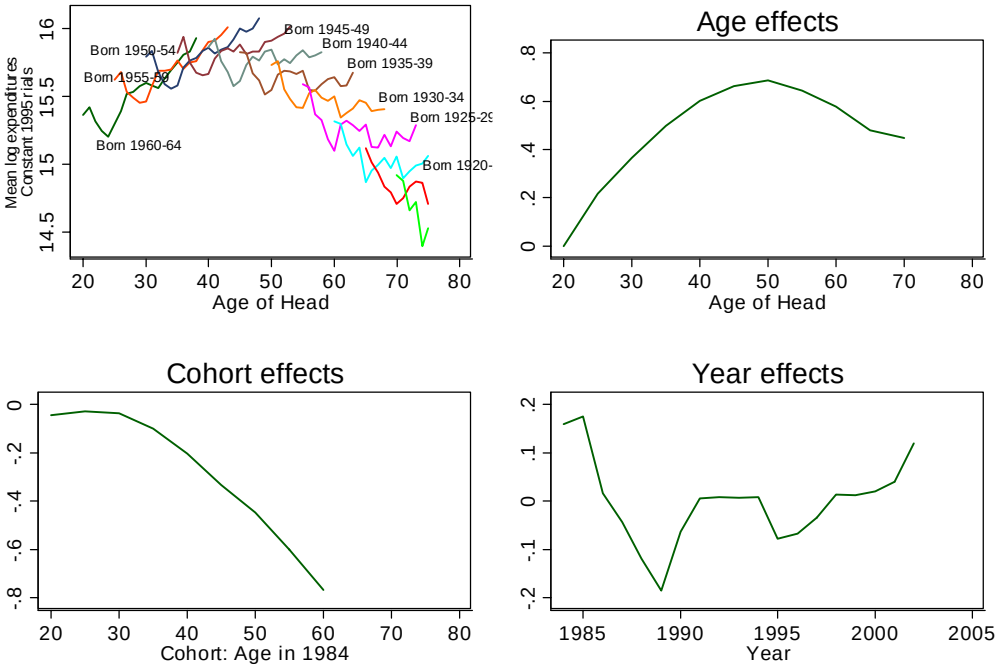


Figure 14a: Decomposition of total expenditures



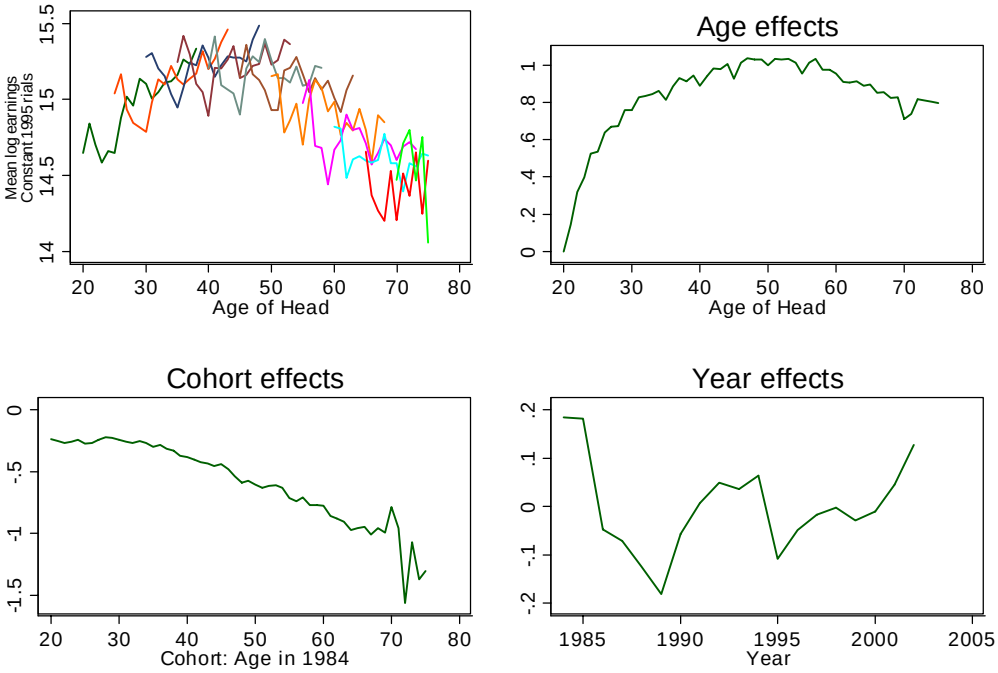
Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002

Figure 14b: Decomposition of total expenditures for 5-year cohorts



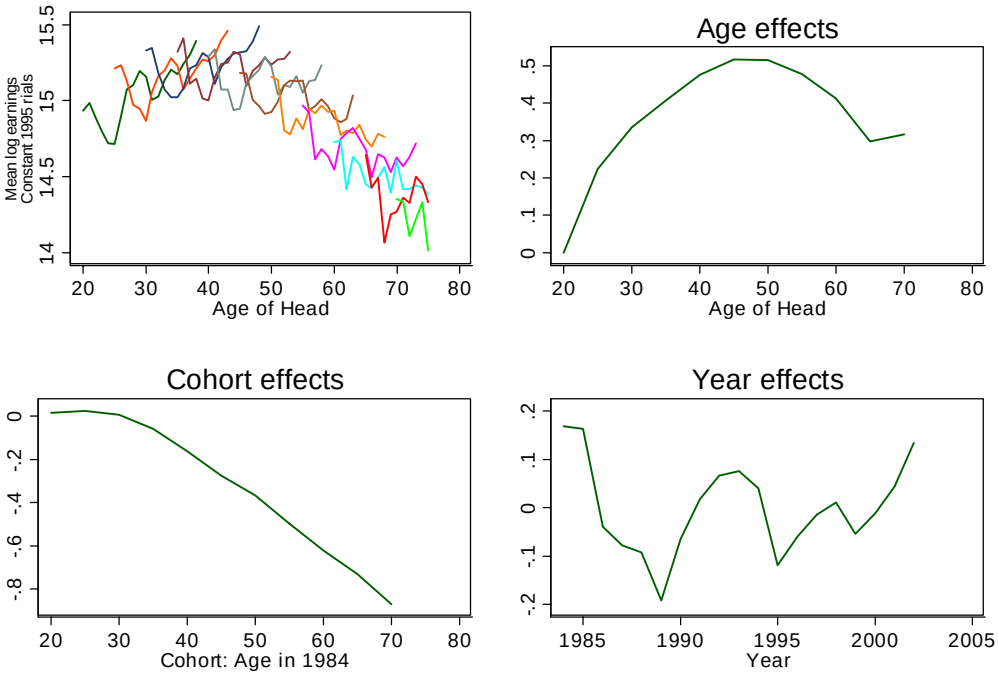
Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002

Figure 15a: Decomposition of household earnings, by cohort



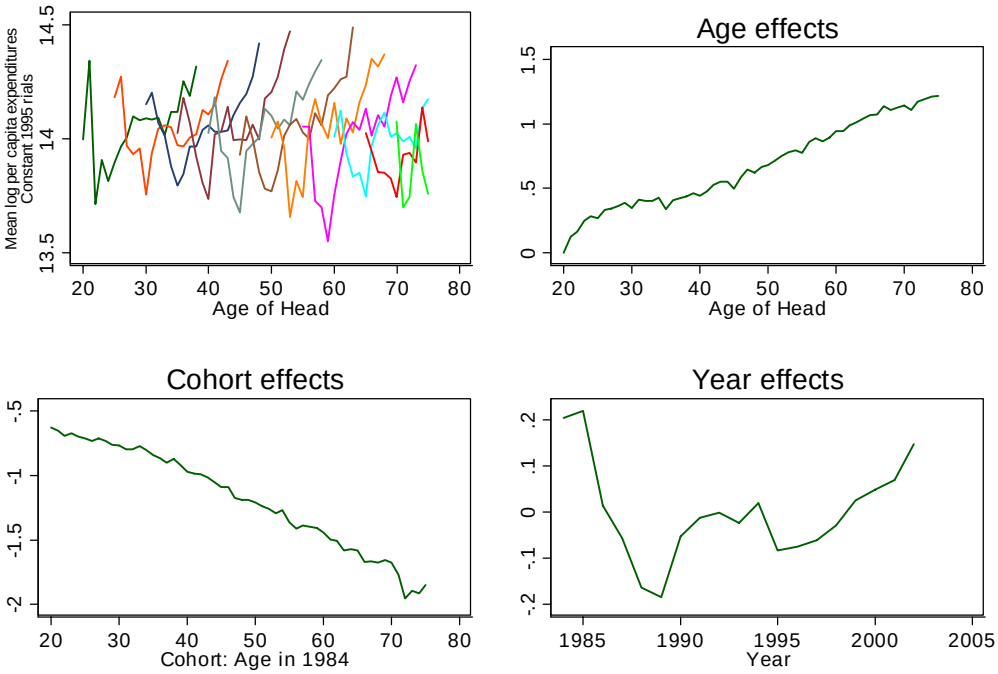
Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002

Figure 15b: Decomposition of total earnings for 5-year cohorts.



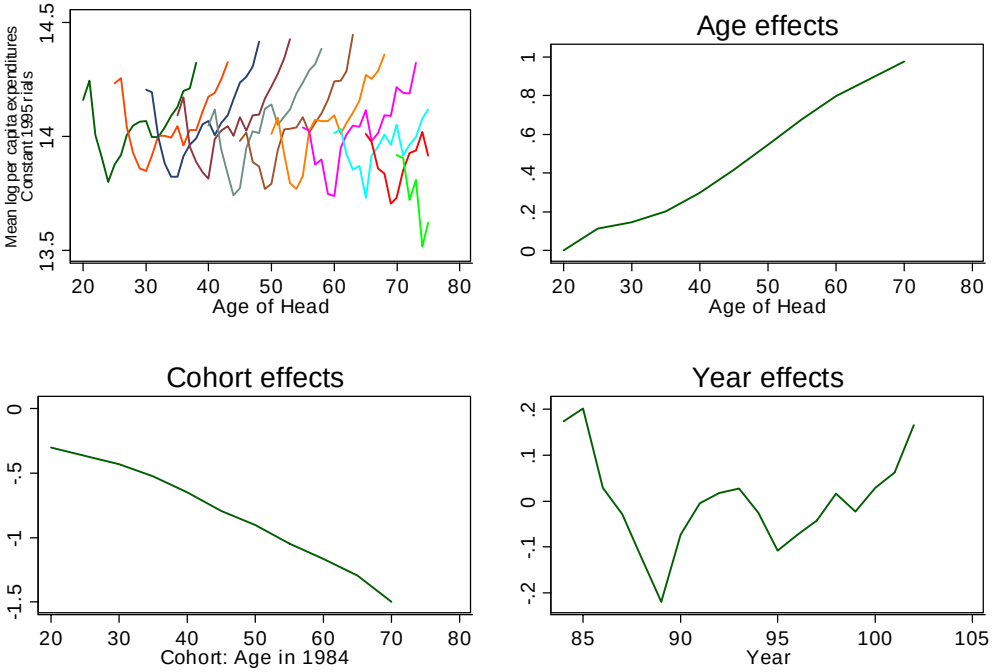
Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002

Figure 16a: Decomposition of per capita expenditures



Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002

Figure 16b: Decomposition of per capita expenditures for 5-year cohorts



Note: Author's calculations based on Household Expenditure and Income Surveys 1984-2002