Reversal of fortunes: a cohort analysis of lifetime earnings in Iran*

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Abstract

The Islamic Revolution of 1979, the eight-year war (1980-88) with Iraq, and the collapse of oil prices in 1986 dealt huge blows to Iran's economy. In this paper we use a pseudo panel constructed from annual multiple surveys during 1984-2004 to understand how individuals and families have fared through these tumultus times. Using a well-known technique developed in Deaton (1985) and Deaton and Paxson (1994), we are able to track earnings and consumption of cohorts born as early as the 1930s to as late as 1970. Our results show that cohorts born before 1950, who were well into their careers at the time of the Revolution, enjoyed steady increase in lifetime earnings, whereas those born after the mid 1960s, who started their careers during the Revolution and the war with Iraq (the "Revolution generation" for short), experienced losses relative to previous cohorts. Their loss would have been even worse had their schooling not increased relative to earlier cohorts. We present a (counterfactual) decomposition that controls for cohort education and shows a steeper loss of lifetime earnings. Interestingly, decompositions of per capita household income and expenditures, using the age of the household head to define cohorts, tell a different story, one of continuously rising cohort effects. We discuss the role of several factors in explaining the divergence in cohort effects between individual earnings and household level variables: the selection effect caused by the ability of the more well to do to form their own households, income and consumption smoothing between generations within the same family, and public transfers. We conclude by proposing that loss of lifetime earnings by the Revolution generation explains the widespread economic dissatisfaction in Iran which persists despite robust economic growth in recent years.

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1 Introduction

Iran has experienced huge shocks to its economy in the last three decades. The revolution of 1979 was shortly followed by an eight year bloody war with Iraq and the collapse of oil prices in 1986. In this paper we ask how individuals and families have fared through these tumultuous times. We compare lifetime earnings and expenditures of individuals and families before and after the Revolution by following cohorts of individuals over time. Looking at the well being of cohorts offers a deeper understanding of changes in welfare than the common reference to average incomes. Average economic indicators tell us how things are at any point in time, but do not reflect well what individuals and families experience over a lifetime. As Deaton (1997) has remarked, "questions about gainers and losers from economic development can be conveniently addressed by following cohorts over time."

Like others, Iranians often evaluate their economic well being by comparing their lives with those of generations before them, especially their parents. Their comparisons tend to be very gloomy and seem at odds with with the fact that in real terms average incomes are about the same as they were at the height of the 1970s oil boom, which for most Iranians represents the golden age. For example, *The Washington Post* reported average earnings of Iranians in 2003 to be about *one-fourth* of its pre-Revolution level, whereas in fact they earn about the same now.[1] The dire picture painted in these reports, often based on interviews with ordinary people, is not what one expects to hear from people living in an economy that has been growing at about 6 percent per year since 2000. Furthermore, in recent years poverty has declined substantially and even the distribution of income appears to have improved–both have certainly much improved compared to the 1970s–so heightened suffering of the poor cannot explain popular disaffection (Salehi-Isfahani 2006).

The frustrations Iranians express regarding their present economic conditions and the

[1] "In real terms, Iranians *earn one-fourth* of what they did earn [before the 1979 Revolution]," (emphasis added) Afshin Molavi, "Economic Ills Fuel Iranian Dissent," *The Washington Post,* July 8, 2003, A. 13. For more examples see Salehi-Isfahani (2005) and 2006.

nostalgia they feel for the golden age can be reconciled with macroeconomic facts if the comparison is based on lifetime earnings of cohorts instead of period average earnings. A main finding of this paper is that lifetime earnings for cohorts who entered adulthood at the time of the Revolution–the "Revolution generation"–has declined relative to their predecessors. Considering lifetime experiences is especially important for a case such as Iran's where the economy has experienced large booms and busts. Comparisons based on period averages tell only a partial story because most individuals live through both good and bad times, and changes in overall *average* earnings do not accurately describe any particular cohort's life experience. For example, the effect of the 1974-77 boom, which seems to have made a lasting impression on Iranians of all ages, on the lifetime earnings or consumption of any specific cohort is limited because four years are only a fraction of any cohort's life. Similarly, the impression left by the worst years of the war (1985-88), as bad as it has been for the life experience of most Iranians, was still short compared to a lifetime. So, to the extent that all cohorts have experienced both good and bad times, the comparisons between life cycle consumption of successive cohorts may tell a different story than the ups and downs of average earnings.

Since the seminal article by Norman Ryder (1965), sociologists and demographers have been aware of the conceptually separate cohort, age, and period effects on a variety of indicators such as fertility, mortality, and labor force participation. A growing literature in economics also recognizes the importance of distinguishing empirically between cohort, age, and period effects on consumption and earnings of individuals and families (Attanasio and Davis 1996; Beaudry and Green 2000; Blundell and Preston 1998; Burbidge, Magee, and Robb 1997; Deaton 1985; Deaton and Paxson 1994; Deaton 1997; Deaton and Paxson 2000; Heckman and Robb 1985; Mckenzie 2006a; Mckenzie 2006b; Shorrocks 1975), and in labor supply (Farkas 1977; Clogg 1982; Beaudry and Lemieux 1999; Attanasio and Sanchez-Marcos 2004). Deaton (1985) pioneered the use of annual surveys to track cohorts over time

and offered a technique to decompose changes in cohort averages over time into period, age, and cohort effects. We are fortunate to have access to an unusually long series of household expenditure and income surveys, taken between 1984 and 2004, which allow us to track cohort income and expenditures for 21 years, encompassing the economic decline of the 1980s as well as the boom of the 2000-04.[2] We use data from these surveys to construct profiles of income and expenditure for individual cohorts as they age. This enables us to follow cohorts born as early as 1934 between the ages of 50 and 70 (observed during 1984-2004), and those born as late as 1969 between the ages of 15 and 35. By decomposing changes in average income (or consumption) into changes that result from age, period, and cohort effects, we are able to identify changes in permanent income or consumption (cohort effects) for cohorts from 1934, who lived and worked mostly before the Revolution, to those born in the late 1969, whose adult life was after the Revolution. While no cohort is observed for the entire life cycle, the method we employ allows us to estimate shifts in the position of the life-cycle income and consumption profile of each cohort over time. Our methodology follows closely (Deaton and Paxson 1994) who employ a semi-parametric regression for the decomposition. We explain this methodology in Section 4.

Our results for individual earnings are plausible and consistent with well known facts about fluctuations in Iran's economy. The period effects estimated from the survey data accurately reflect the fluctuations in the economy reflected in macroeconomic data, and the life-cycle earnings and expenditure profiles show a typical inverted U-shape. The cohort effects, which essentially compare the position of income or expenditure profiles between cohorts and are therefore of most interest to us, show a rising trend for cohorts born before the mid 1950s, who were at least in their mid twenties in 1979. The cohort effects show a distinct declining trend for later cohorts born in the 1960s. We also consider cohort changes in income and expenditure at the household level, defining cohorts based on the age of the

[2]In his study of savings and consumption in Taiwan, Mckenzie (2006b) also uses 21 consecutive surveys.

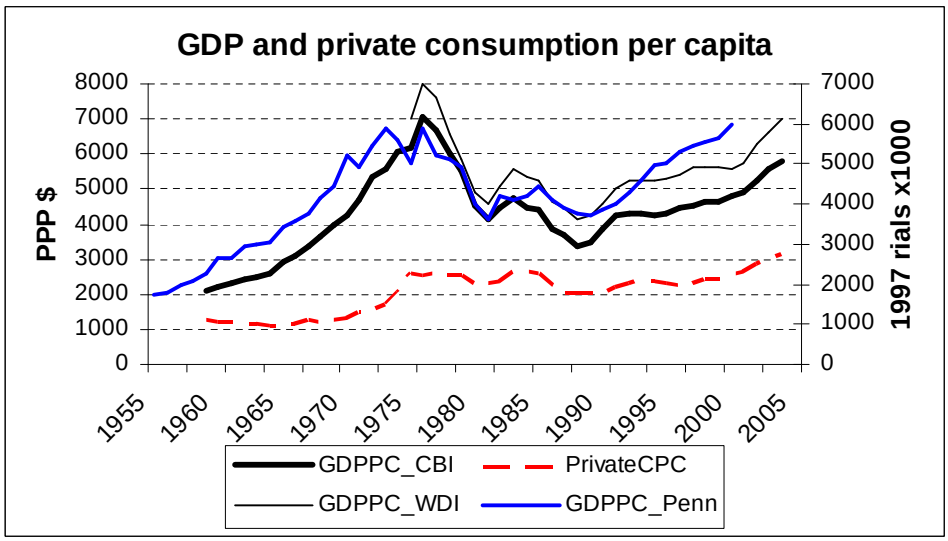
head of household. Cohort income and expenditures data reflect, in addition to earnings, transfers within the household and from the government. We find that, in contrast to individual earnings, cohort effects for per capita income and expenditures rise continuously for all cohorts, which indicates that, at least for those who are able to form households, lifetime welfare may have increased even for the Revolution generation.

The plan of this paper is as follows. Section 2 provides a brief overview of the macro-economic shocks in the last three decades. Section 3 introduces the micro data, and section 4 describes the decomposition methodology. Section 5 presents the empirical results for individual earnings and 6 for per capita household income and expenditures. Section 7, discusses the implication of our findings for Iran's political economy and offers concluding remarks.

2 The Iranian Context

The Islamic Revolution interrupted the longest period of economic growth in Iran's history, which began with Iran's brief growth miracle in the 1960s, when the economy grew at nearly 9 percent per year unaided by large inflows of oil money, and ended with the oil boom of 1973-77 (Figure 1). The economic collapse of the 1980s, coming as it did after 25 years of steady improvements in the standard of living, is why today there exists a widespread feeling of lost fortunes as a result of the Revolution, even though economic growth since the end of the war with Iraq in 1988 has erased most of those losses measured by *average* indicators. Figure 1 depicts the wide fluctuations in GDP and private consumption per capita taken from Penn World Tables (Summers, Heston, and Aten 2002), the World Bank *World Development Indicators*, and the Central Bank of Iran. All three series show, in addition to the long period of economic growth in the 1960s and 70s, the economic collapse after the Revolution, and how the recession deepened during the war with Iraq (1980-988) and following the collapse of oil prices in 1986. By 1987, GDP per capita was down by about

Figure 1: The rise and fall of GDP per capita in Iran, 1955-2005



Notes: GDPPC-Penn and GDPPC-WDI are measured on the left axis and GDPPC-CBI on the right. GDPPC-Penn is from Penn World Tables, which corrects for differences in purchasing power. It shows that per capita GDP exceeded its peak before the Revolution by the year 2000. GDPPC-WDI is from the World Bank World Development Indicators data set and also uses (2000) international (PPP) dollars. The GDPPC-CBI series is from the Central Bank of Iran and is measured in 1000 1997 rials. Source: World Bank (2003), Penn World Tables, and Central Bank of Iran, *Annual Report*, various years.

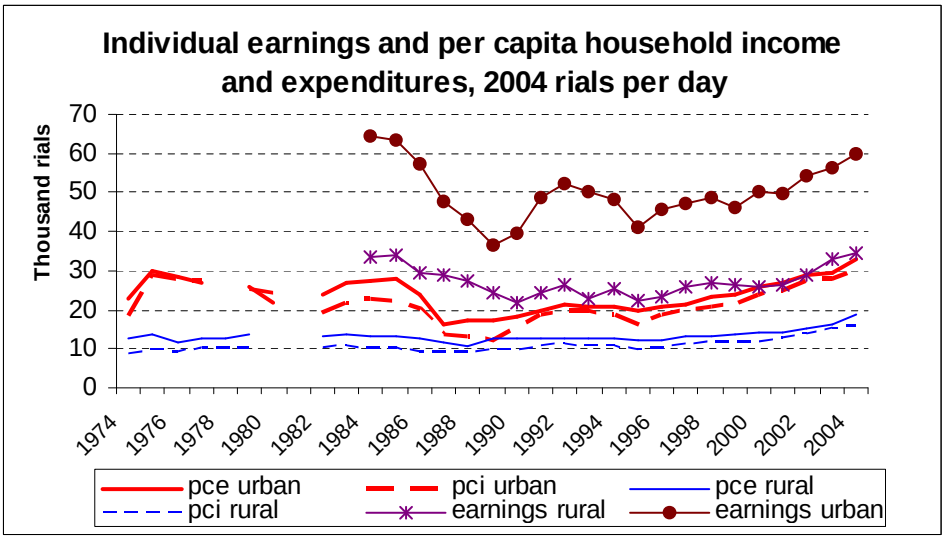
50% compared to its peak in 1975. They also show how the pace of economic recovery since 1989 depended on fluctuations in the price of oil. Growth was robust when oil prices spiked as a result of the first Persian Gulf war in 1990-92, was very slow in the mid-1990s when oil prices hit a thirty year low in 1998, and has picked up pace with rising oil prices since 2000. From the macro perspective, the best of times were in 1973-77, before the start of revolutionary disruptions in 1978, and the worst of times were the mid 1980s.[3]

The macro data in Figure 1 also shows that fluctuations in private consumption were softened considerably as investment took the brunt of the macroeconomic shocks. The survey data we use in this paper is the best source for trends in personal income and consumption, but is only available for 1974-2004 (Figure 2). All series show declining real

[3]According to the GDP series published by the World Bank and Central Bank of Iran, even in the 1990s per capita output was 30 percent lower. The Penn World Tables, Mark 6.1, tracks the other two closely, but show a smaller decline.

individual earnings and household expenditures until 1988 and slow recovery since then.

Figure 2: Fluctuations in individual earnings and average household income and expenditures, 1984-2004



Source: HEIS, 1984-2004.

3 Survey Data

The data we use to tracks cohort income and expenditures consists of 21 rounds of the Household Expenditures and Income Surveys (HEIS) surveys of expenditures and incomes conducted annually by the Statistical Center of Iran (SCI) since 1963. The surveys for 1984-2004 are now available in unit record and form the basis of this study. New samples are drawn each year, so it is not possible to track individuals or households over time. These surveys are used to construct national macroeconomic statistics, so they are scrutinized carefully, and seem highly consistent over the years. The focus of the surveys is expenditures, which are collected in impressive detail, but there is also information on demographic, labor market status and incomes of individuals.

All expenditure data are collected on recall. 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. Expenditures consistently exceed income (Figure 2) because of under-reporting of incomes, which is not unusual for survey data from developing countries (Deaton 1997, p. 29). Survey respondents may try to hide non wage and salary income for reasons of tax evasion. In Iran employers collect taxes so earnings data suffer less from this particular problem. On the positive side, the gap between incomes and expenditures is not very large (in 2004 about 8 percent in urban areas and 17 percent in rural areas), has remained relatively constant over time, and the two series track each other closely.

The number of households in each survey is about 20,000, except for the worst years of the war, 1986-87, when only 5,700 households were surveyed. The maximum size of the survey was 36,500 in 1995. The number of individuals covered varies from about 37,000 in 1986 to over 193,000 in 1995 (see Table 1 in the appendix for samples sizes). All together there are 2.2 million individuals in the 21 surveys. HEIS reports expenditures rather than consumption. All goods acquired through purchase, home production, or transfers are included (except for in-kind transfers between households which are not reported for most years).

The HEIS follow a two-stage stratified sampling method and has remained the same over time. 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.

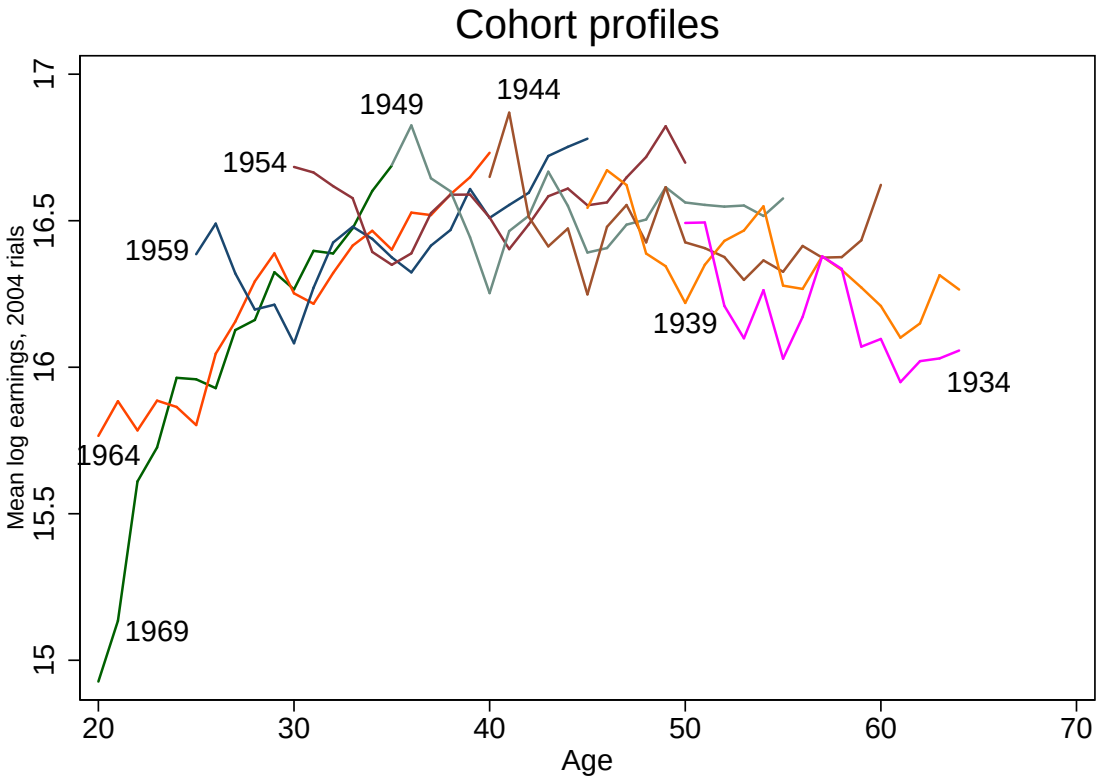
To construct our pseudo panel we define cohorts by their birth year and extract their earnings from consecutive surveys. For example, the 1964 cohort is first observed in 1984 and last in 2004. The earnings profiles are easily constructed by using the average earnings of 20 year olds in 1984, 21 year olds in 1985, and so on. Figure 3 summarizes cohort earnings profiles for cohorts born since 1934 in 5 year intervals, to keep the graph readable. All individuals who report income from wages and self employment are included in the sample. The first line on the left is average earnings of all individuals born in 1970, whom we observe from age 14 in 1984 to age 34 in 2004, but who appear in our empirical sample for 15 years only, from 1990-2004, since we limit the age range to 20-64. The last line to the right belongs to the oldest (1934) cohort whom we observe, again, for 21 years but are in our empirical sample for 15 years, from age 50 to 64 (between 1984 and 1998). Except for the youngest and oldest five cohorts, all others are observed for 20 years.

4 Methodology

The objective of our analysis is to estimate the relative position of the life-cycle profile of earnings and consumption for different cohorts. The actual profiles of earnings depicted in Figure 3 combine the effects of ageing as well as secular trends. To decompose these two effects we follow the methodology pioneered by Deaton (1985, Deaton and Paxson (1994), and is described in detail in Deaton (1997). This approach assumes that all cohorts have a common age profile according to which their earnings rise during the early career and decline later in life. This allows the lifetime earnings of any cohort to be compared with another by measuring the shifts of the entire age profile relative to a reference cohort.

The common age profile is estimated from the data semi-parametrically, as regression coefficients for age dummies–called the age effects–and similarly the relative positions of co-

Figure 3: Average earnings of individuals by cohort



hort age profiles–cohort effects–are estimated as coefficients of the cohort dummies. Since no cohort is observed for its entire productive career, we have to estimate the common age profile from earnings of different cohorts who are observed during different phases of their life cycle. Cohort earnings depicted in Figure 3 are also affected by cyclical shocks that temporarily move cohorts off their common life-cycle profiles. We estimate these cyclical shocks–period effects–as coefficients of year dummies, making sure that all trend is attributed the cohort effects.

The implementation of this technique is illustrated with the help of this equation for the logarithm of earnings:

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

where α_a is the age effect for age a, γ_c is the cohort effect for cohort c, and ψ_t is the period effect for year t (note that $c = t - a$). Thus, in a given year, differences in earnings between any two cohorts is the sum of differences in age and cohort effects, as the period effects cancel out. Differences in earnings for two cohorts at the same age, then, would be the sum of period and cohort effects. The task of decomposition is to estimate α_a, γ_c, ψ_t. Given that we have no a priori information on the period effects, the best way to estimate γ_c is to use year dummies. Age effects, on the other hand, can be modeled as cubic, quartic, and quintic polynomials, and cohort effects could be even modeled as linear in c. However, if there is enough data to work with, such as in our case, Deaton (1997) recommends using dummies to capture all three effects semi-parametrically. This suggests an estimation equation such as:

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

where A is the matrix of age dummies, C the matrix of cohort dummies, and Y the matrix

of year dummies, and y is the stacked vector of cohort-year observations. The pseudo-panel is constructed from cohort-year pairs where each observation corresponds to a particular cohort in a given year. The number of rows for each dummy matrix is equal to the number of cohort-year pairs; the number of columns for A, C, and T depends on the number of age groups, cohorts, and years, respectively.

Equation 2 cannot be estimated as written because of a linear relationship between A, C and T:

$$As_a = Ys_y - Cs_c, \tag{3}$$

where the s vectors are arithmetic sequences $\{0, 1, 2, 3, ..., \}$ of the length given by the number of columns of the matrix that pre-multiplies them. This is the well-known problem of identification in analysis of cohort behavior (Glenn 2005). The identity in 3 simply states that if we know the birth year of a person and the year of survey, we know his or her age. Of course, like any dummy variable regression, we must first drop one column from each of the dummy matrices. Deaton and Paxson (1994) and Deaton (1997) suggest two additional restrictions to help identify equation 2. They place a restriction on period effects which requires them to average to zero over all periods. This assumption in effect attributes the trend in earnings to cohort effects, which is exactly what we want because we are interested in how the level of prosperity changes between cohorts rather than over time.[4] Because this method attempts to separate the trend from the cyclical variations in the variables of interest, it places great demands on the data. As Deaton (1997, p. 126) warns, this procedure requires a sufficient number of surveys (long enough time series) for the separation of the trend from the transitory shocks to be carried out with confidence. In addition, identification of the period effects requires sufficient variation in the variable of

[4] An alternative method developed by Mckenzie (2006a) which also effectively attributes trends in income or expenditure to cohort effects, uses different assumptions to arrive at the decomposition. In our data, we noticed a drawback in Mckenzie's method in that it seemed too sensitive to the choice of the peak of the age profile, though the results were generally similar to Deaton's method.

interest over time to make the estimation possible (Glenn 2005). Fortunately, both in terms of the number of surveys (21) and variation in income and consumption our data meet this requirement.

The normalization that sets the average period effects to zero (and makes the year effects orthogonal to the time trend) is written as:

$$s_y^{'}\psi = 0. \tag{4}$$

Subject to this normalization, we can estimate equation (2) by regressing y on dummies for each cohort excluding the first, dummies for each age excluding the first, and a set of 19 year dummies defined as follows for $t = 3, ..., 21$ (the first and second year dummies are dropped to achieve identification).[5] Through the regression we obtain estimates of the year effects for 1986-2004. The year effects for 1984 and 1985 can be recovered by the fact that all year effects add to zero and satisfy (5).

5 Decomposition of individual earnings

We begin with the decomposition of individual earnings (defined as net wage and salary income plus net income from self employment) presented in Figure 4 (the detailed estimation results are presented in Appendix Table 4). In the top left corner graph we present cohort profiles as they appear in the data before any decomposition. Each line in this graph represents the average earnings of a particular cohort as it ages during the period in which it is observed in successive surveys (the graph depicts every tenth cohort only).

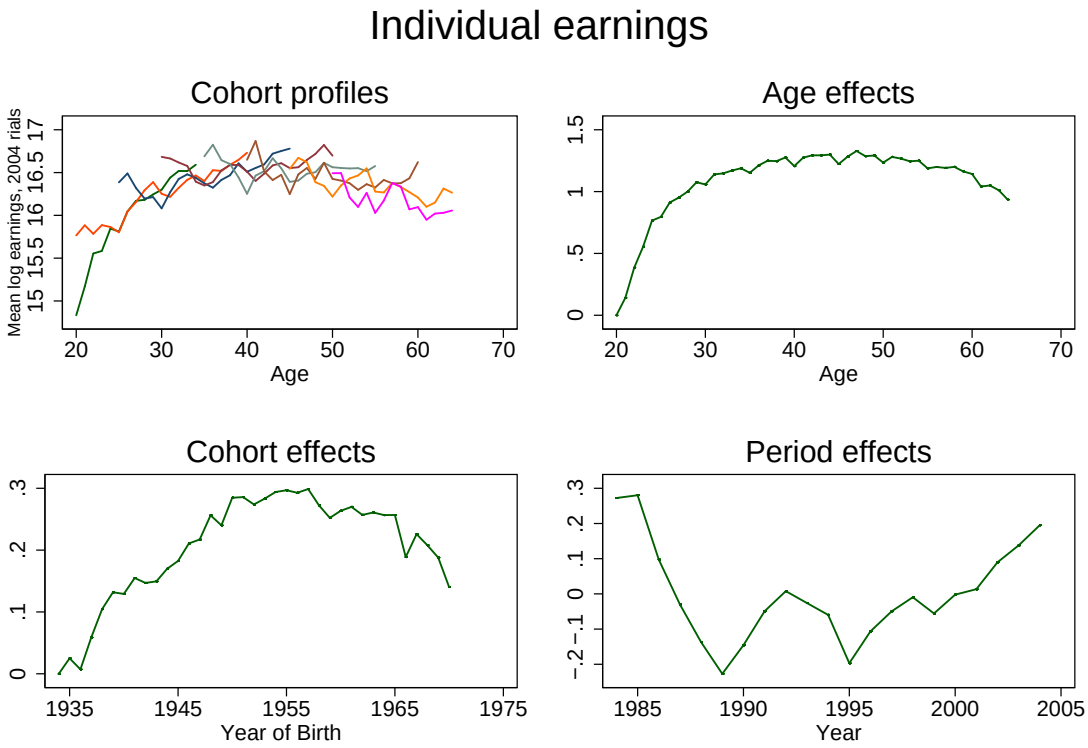
The first line from the left shows the average earnings for the cohort that was born in

[5]This restriction is implemented via the following relation between the year dummies (Deaton 1997):

$$d_t^* = d_t - (t-1)d_2 + (t-2)d_1, \tag{5}$$

where d_t is the usual year dummy equal to 1 if the year is t and 0 otherwise. This procedure enforces the restriction in (5) as well as the restriction that dummies must add up to zero.

Figure 4: Decomposition of real individual earnings



Source: Authors' calculations based on Household Expenditure and Income Surveys 1984−2004

1964 whose members were 20 years old in 1984 when they first appeared in the surveys, and were observed until 2004 when they were 40. The second line from the left shows the earnings for the cohort born in 1954 and observed between ages 30-50, and so on. The last cohort profile shown belongs to the 1934 cohort whom we observe between ages 50-70, but is only shown until age 64, because we limit the age range to 20-64.

For cohorts who live through a long period of economic growth the lines representing actual cohort profiles would not cross each other, as they do here; instead, the profiles for younger cohorts would lie to the left and above older cohorts, as they do for Taiwan (Deaton 1997, p. 118). In Iran, the large economic decline of the 1980s hurt every cohort's earnings and caused the line representing earning profiles to cross (Figure 4). The period effects are quite visible in the shape of the actual cohort earnings profiles because they all show the effects of the big collapse of the 1980s. Cohort and age effects are difficult to discern from this graph, but the decomposition reveals several interesting patterns.

The estimated age effects, shown in the top right corner of Figure 4, exhibit the familiar inverted U-shape. Incomes rise rapidly until about age 30, stay fairly flat until about age 50, and decline thereafter. This is in contrast to the age profile for Taiwan presented in Deaton (1997, p. 118), wherein incomes rise moderately well into the middle age, until about age 50. The year effects, shown in the bottom right corner of Figure 4, capture the macroeconomic fluctuations around a trend. They portray Iran's macroeconomic conditions depicted earlier in Figure 1 quite accurately: the sharp drop in incomes during 1984-89, the rise in oil prices in 1990-91, the imports compression shock of the mid-1990s, and the economic growth of the last four years, are all accurately reproduced here.

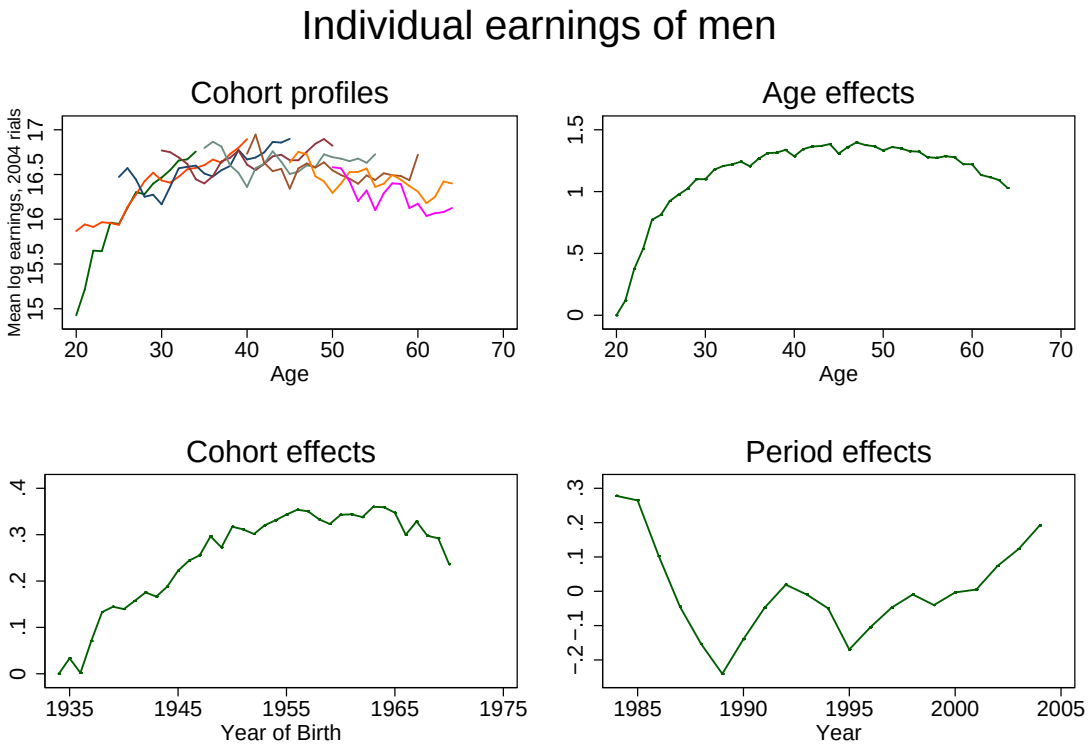
The estimated cohort effects, depicted in the bottom left corner of Figure 4, are of greatest interest to us. There is a clear positive cohort effect for successive generations born before 1950, who were mature adults and perhaps well into their careers (30 years and older) at the time of the Revolution in 1979. For those born between 1950-64 and therefore

quite young in 1979 (15-29 years old), the cohort effect is roughly constant, implying no improvement in lifetime welfare for this group of cohorts. The most interesting observation is the decline in the cohort effects for the youngest group of cohorts, born between 1965-70, who reached labor market entry age after the Revolution. Those born in 1970, for example, had the same lifetime earnings as the cohort born 30 years earlier. Or, put more strikingly, in terms of life time income the youngest cohorts seem to have fared worse than their parents (born 25 years earlier). For most people in growing economies who find themselves in the losing end of comparisons with peers, a consoling thought might be that they are at least doing better than their parents. Not true for this group of young Iranians. Their disappointment with their lot finds support in our findings: the adverse social and economic conditions due to revolutionary upheavals, the war, and the oil price collapse of the 1980s, cost them heavily in terms of lifetime earnings. As we show below in section 6, because of greater intra family transfers and government subsidies in the post Revolution period, in terms of consumption they may not be a whole lot worse off than their parents. However, to the extent that a person's self worth is measured by his or her own earnings, the Revolution generation must feel worse off than their parents, which is a rare phenomenon even in the developing world.

The cohort effects in Figure 4 exaggerate the extent of the loss for young men because they are estimated from the samples of men and women. This arises because women earned less than men (about half on average for each year) and their proportion among earners increased slightly from about 10 percent for 1930s cohorts to 20 percent for cohorts born in 1970. The results of the decomposition for men only, presented in Figure 5, show a slight lift in the cohort effects for the younger cohorts. Evidently, the cohort effects for younger women (say born after 1960) were worse than for younger cohorts of men, but unfortunately there are not enough observations to perform the decomposition for women alone.

The negative cohort effects for the younger cohorts is more striking when we note that

Figure 5: Decomposition of individual earnings for men



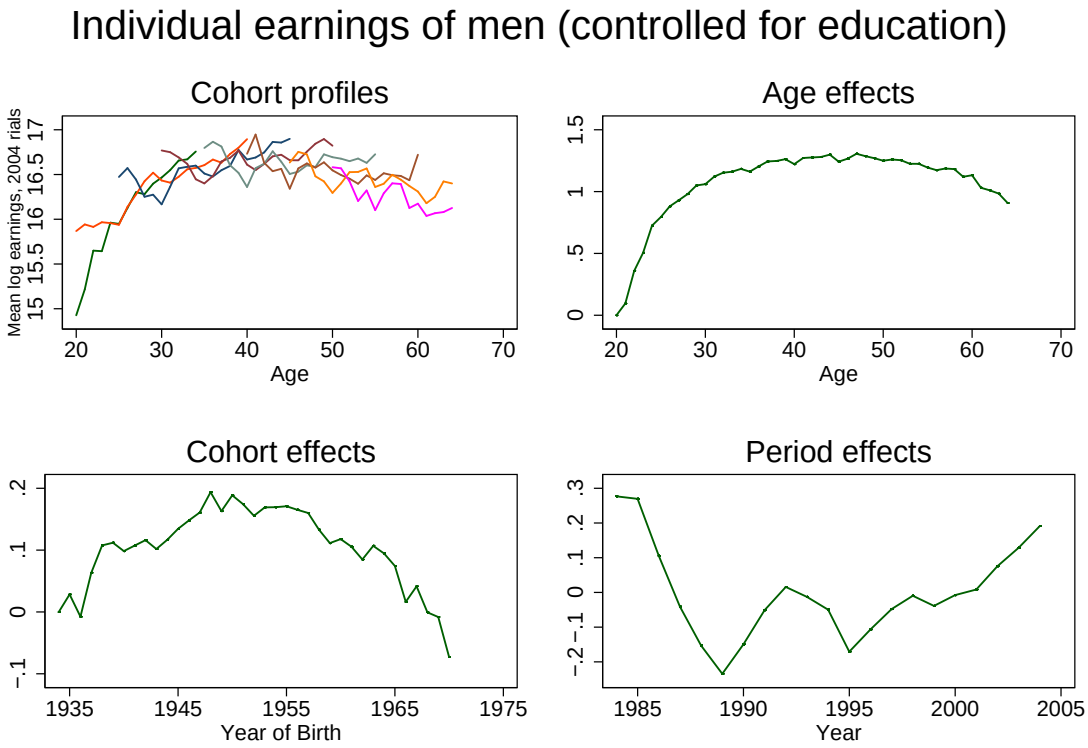
Source: Authors' calculations based on Household Expenditure and Income Surveys 1984−2004

they are more educated than older cohorts. Cohorts born in 1965-69 reported on average 6.7 years of schooling in 2004, compared to 3.5 years for those born in 1945-49, yet their estimated lifetime earnings are about the same. Quite possibly, returns to education declined substantially for the younger cohorts who had nearly twice as many years of schooling but earned the same over a lifetime compared to the older cohorts. It is interesting to ask what would have been the extent of the loss for the younger cohorts had they not accumulated the extra years of schooling (assuming that education had remained as productive for the young as old). This counterfactual is performed by adding years of schooling to the right hand side of the decomposition equation 5 to control for increase in schooling. As expected, the results presented in Figure 6 show an even more dramatic decline in cohort earnings for the youngest cohorts. The loss of earnings for the younger cohorts born in the 1960s would have been 40 percent relative to those born in the early 1950s. The negative cohort effects not controlling for education thus indicate a sharp decline in either the quality of education or in rewards to education for the younger cohorts compared to older cohorts. There is little doubt of loss of education quality for those in their last years of high school or entering universities in the 1980s (cohorts born in the 1960s), when the Iraq war and the disruptions caused by Cultural Revolution led to the departure from Iran of the country's most talented faculty. As part of the Cultural Revolution universities were closed for two academic years during 1981-83, and many faculty deemed un-Islamic were purged.

6 Decomposition of per capita household income and expenditures

Individual earnings may not reflect economic welfare for at leat two reasons, intra-household transfers between generations and transfers from the government to households. Most individuals are also members of households which enables them to consume more or less

Figure 6: Decomposition of individual earnings



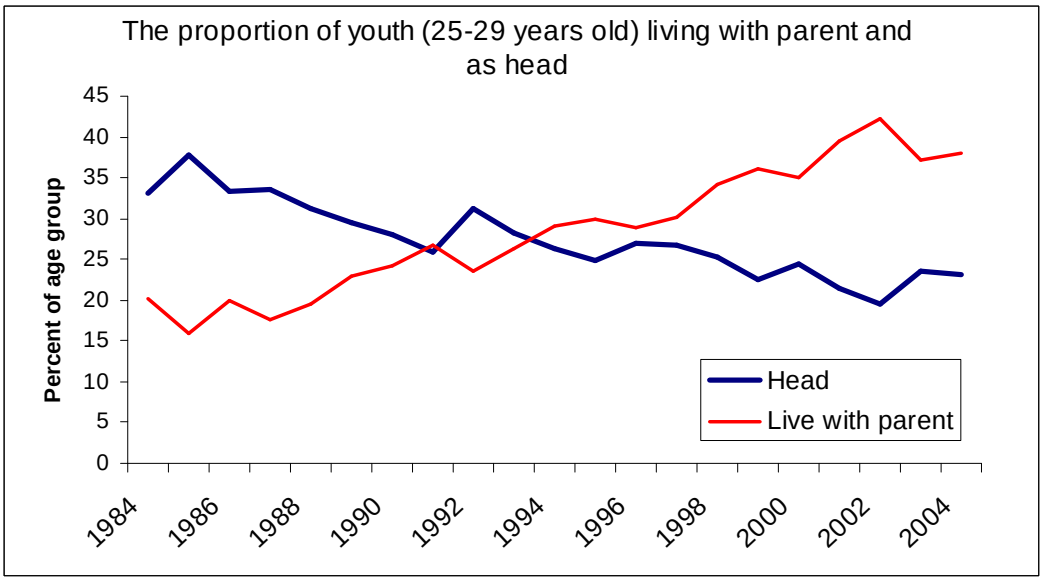
Source: Authors' calculations based on Household Expenditure and Income Surveys 1984−2004

than what they earn, even during a lifetime. Households in turn receive transfer of various kinds from the government, such as subsidies and non-monetary payments, which raises consumption above household monetary income.

The significance of consumption smoothing within households can be gauged by the relatively high proportion of young people who live with their parents. The young, who suffer from disproportionately high rates of unemployment (Salehi-Isfahani 2005), have been less able to move out of their parents' home and form their own households. In 2004, unemployment rates for individuals 30 years and older was less than 4 percent compared to 25 percent for those aged 20-24. Since individuals must work before they can collect unemployment benefits, young first-time job seekers are not eligible for unemployment insurance, and their families are the only source of support. The younger, less well-off cohorts in our decomposition (born in the 1960s) are the parents of the presently unemployed who, in addition to loss of earnings, must bear the burden of consumption smoothing for their children. During 2000-04, about 40 percent of men aged 25-29 years lived with their parents and 23 percent were heads of households. These numbers are in stark contrast to numbers from the 1980s when less than 20 percent of the age group lived with their parents and 33 percent were head (see also Figure 7). The frustration of the young for not being able to form their own households has naturally spilled over to the Revolution generation, thus magnifying their economic loss. To account for the effect of resource pooling within the household, as well as transfers from the government, we experimented with using household level income and consumption rather than individual earnings in measuring changes in cohort economic welfare.

In going from individuals to households we face two decisions: how to define cohorts and how to measure individual income and consumption from household level data. We follow previous works in the literature which define cohorts based on the age of the household head (see Deaton and Paxson 1994 and Mckenzie 2006b). This introduces a potential selection

Figure 7: The declining ability of the young to form households

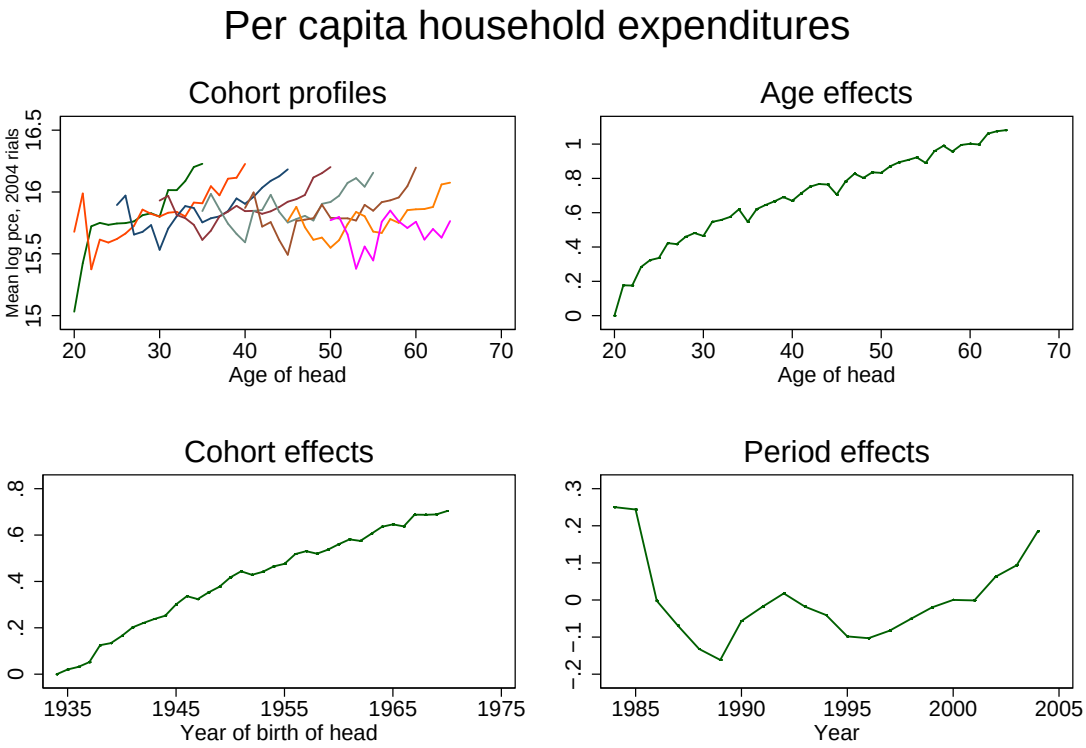


bias if, plausibly, the young adults who live with their parents and are therefore excluded from the sample happen to be less well-off. We examine this issue more carefully below by following Deaton and Paxson (1994) and Mckenzie (2006b) in defining in per capita income and consumption in terms of equivalent adults, weighting household members 17 year and younger by 0.5.

Figures 8 and 9 show the decomposition of per capita household income and expenditures for cohorts defined by the birth year of the household head. The estimated period effects are remarkably similar to those for individual earnings, which raises confidence in what we learn from the data about the timing and extent of the cyclical macroeconomic shocks. However, the age and cohort effects, which these decompositions share, differ from the pattern observed for individual earnings. The estimated age profiles are no longer like an inverted U; instead they rise continuously till age 64, which is the oldest we include in our sample. These age profiles are similar to the age profile of consumption reported in Deaton (1997, p. 118) for Taiwan, which do not exhibit decline in consumption after a certain age.

The rising age profiles observed in these graphs most likely reflect the fact that household resources increase with age of the household head until the age when children begin to leave the household. In 2004, the smallest households with 2.45 members were those headed by 20 years olds, and the largest with 5.61 members were headed by 49 year olds; the oldest households had 4.4 members.

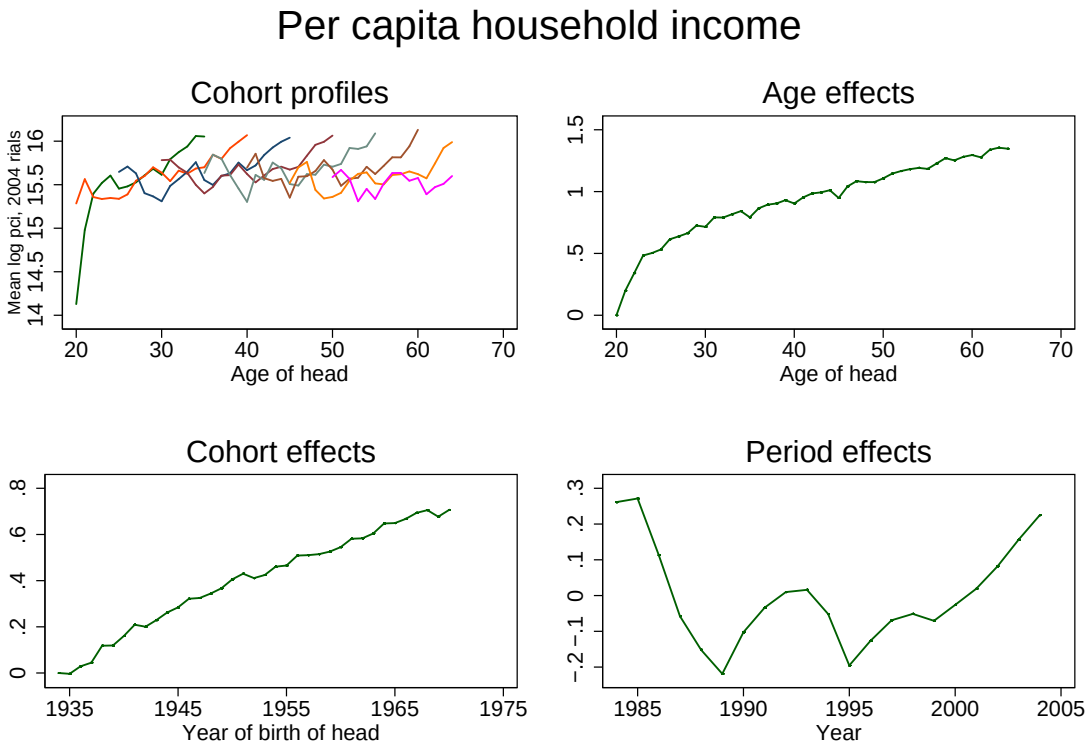
Figure 8: Decomposition of per capita household expenditures



Source: Authors' calculations based on Household Expenditure and Income Surveys 1984−2004

The most interesting difference is between the shape of the cohort effects estimated for household level variables and individual earnings. In contrast to the cohort effects for individual earnings, according to which the Revolution generation lost ground, the cohort effects for per capita income and expenditures show their fortunes to be rising relative to their parents. Two possible explanations for this difference come to mind. The selection

Figure 9: Decomposition of per capita household income



Source: Authors' calculations based on Household Expenditure and Income Surveys 1984−2004

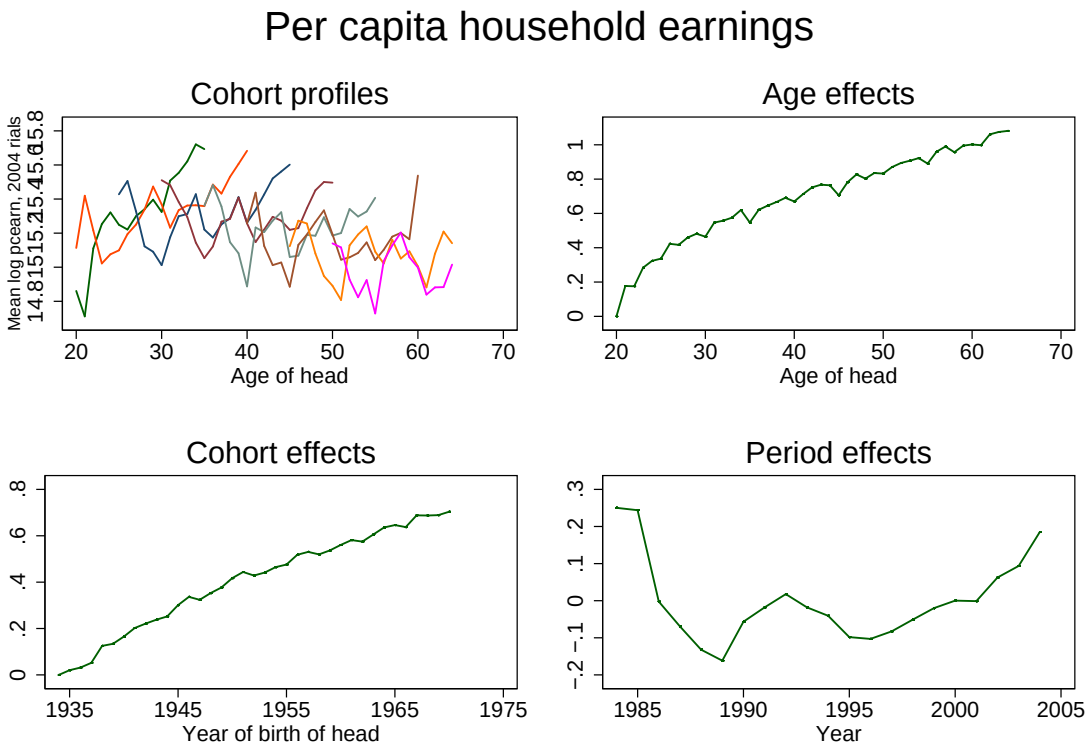
bias just noted is the obvious candidate to explain this difference. Our younger cohorts, the Revolution generation, are observed in their twenties and early thirties in our sample. As Figure 7 shows, these individuals are increasingly less likely to form their own household and are therefore excluded from the data used in per capita decompositions. The selectivity may not matter if those who stay with their parents earn about the same as those who are able to form households, but this is not the case. Among the 20-29 year old individuals who reported earnings, heads of households earned on average twice as much as those who lived with their parents. Thus, the estimated cohort effects for household level variables may overstate the gains by younger cohorts because the sample is selective of high earners in these cohorts.

How much of the rising cohort effects observed in per capita variables is due to selection effect and how much is due to increasing transfers this generation receives from its parents and the government? We know that resources available to individuals, in addition to what they receive from other members of the household, are supplemented by nonmonetary payments and government subsidies. For example, in 2004 real expenditures were boosted by nonmonetary payments amounting to about 31 percent of average incomes and commodity subsidies averaging about 22 percent of private expenditures. Thus individuals may earn less than before but consume the same or even more.

To get an idea of the effect of selection we considered what the cohort effects would look like if the transfers were only from the earnings of other family members. For this purpose we decompose per capita household earnings (Figure 10), which produce virtually identical cohort effects to per capita income and expenditures. The difference between the cohort effects for individual earnings and per capita earnings are from three likely sources: the falling average family size, the selection effect, and more family members working. All these sources would boost per capita earnings for younger cohorts, but only the first two have support from our data. The similarity between the decompositions of earnings

per capita on one hand and income and expenditure on the other suggests that these two factors, rather than transfers, are the cause of the rising cohort effects for that part of the Revolution generation who are household heads.

Figure 10: Decomposition of per capita household earnings



Source: Authors' calculations based on Household Expenditure and Income Surveys 1984–2004

Even if selection is not the major cause of the undoing of the negative cohort effects for younger cohorts, and income pooling and transfers have helped them keep enjoy a rising standard of living, it is still true that falling lifetime earnings observed in Figures 4–6 must be a source of huge disappointment for the Revolution generation. Loss of earnings for the young is loss of self-esteem which is not compensated for by transfers.

7 Discussion and concluding remarks

We examine changes in earnings and expenditures of cohorts of Iranians who lived through tumultus times during the last three decades. We find evidence that the generation of Iranians who reached adult life at the time of the Revolution–the Revolution generation–lost in terms of real earnings relative to their predecessors. We show that all cohorts born before the mid 1950s, who were at least in their mid twenties at the time of the Revolution in 1979, experienced gains in lifetime earnings relative to older cohorts. However, the younger cohorts born after 1960, who were in their late teens or early twenties in 1979, have lost relative to their predecessors.

Swings in cohort earnings, even of cohort losses, are not unusual, though it is rare to find a reversal of fortunes as dramatic as what we observe in the case of Iran. Two explanations are frequently encountered in the literature on determinants of earnings. One, due to Easterlin (1968), emphasizes cohort size (see also Burbidge, Magee, and Robb 1997). In Iran there is nothing exceptional about the size of the cohorts born after 1950 relative to their predecessors. Indeed, the largest cohorts were born much later, in the early 1980s. We are unable to say much about these cohorts because they have only recently entered the labor market and we have just begun to observe them in our surveys.[6] Another explanation emphasizes the conditions of the labor market at the time of a cohort's entry. Behrman and Birdsall (1988) identify such a cohort effect for returns to education for Brazil. The idea is that labor market conditions during a person's early years of work are critical for human capital growth because of the importance of on-the-job training. This explanation fits better with the facts concerning Iran. The Revolution and the war that ensued were not only very costly in terms of lives, but also of human capital. Universities in Iran provide much incentive for all prior education levels. They were closed for two full academic years

[6]When we push the limits of our data to learn about the cohort effects of even younger cohorts, we actually notice, contrary to the Easterlin hypothesis, positive cohort effects, but observations are too few to say anything with certainty. Future rounds of the HEIS survey could throw light on this conjecture.

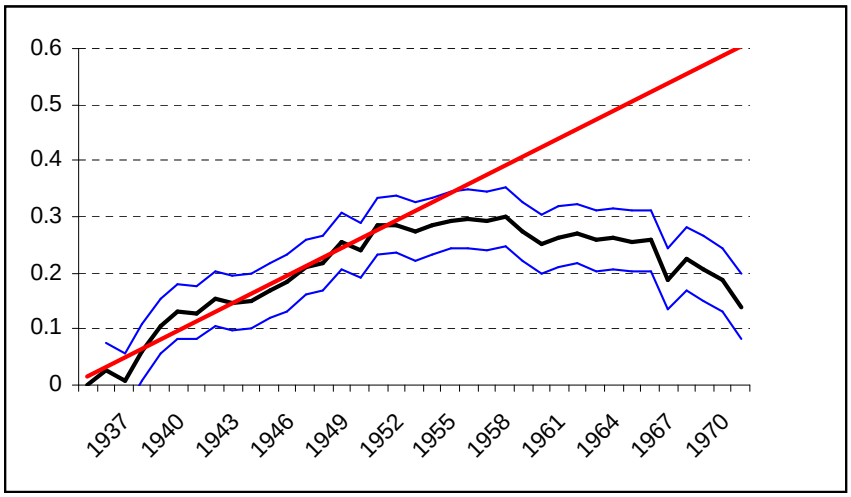
during 1980-82 while the academy was purged of non-Islamic elements. In addition, the war diverted millions of young people away from attending high schools and universities to the war front. Finally, disruptions in employment relations following the Revolution (Bayat 1987; Nomani and Behdad 2006) reduced the incentives and the effectiveness of on-the-job learning. Significantly, average years of schooling for successive cohorts has been rising consistently during the entire period under consideration (Salehi-Isfahani 2005). Thus stagnant or declining cohort effects in earnings imply a significant decline in the quality of education or in the rate of return to education after the Revolution.

Our results provide a different interpretation of the nostalgia many Iranians feel for pre-Revolution days than the commonly held view of rising poverty and inequality or general economic decline in Iran (Salehi-Isfahani 2006). As noted earlier, we find the latter explanation not convincing because it fails to note that the economy has at least recovered its former peak. By decomposing period and cohort effects, our approach reconciles the nostalgia with the fact of economic recovery. Our results show that for a long succession of cohorts lifetime income was increasing, generating the sort of optimism that comes with seeing one's parents do better than their grandparents and so on. Then came the Revolutionary upheavals, the war, and the largest oil price collapse in history, which together eventually reversed many fortunes. The cohort evidence shows that the young revolutionaries, those in their late teens and early twenties, and at the height of Revolutionary optimism, were hit the hardest by the events that followed and lost in lifetime income relative to their predecessors.

Figure 11 demonstrates this disappointment by comparing where they, as a cohort, might have expected to find themselves and where they actually ended up. The trend line is a simple projection forward of the cohort effects of those born between 1935-1950. It indicates what the Revolution generation would be expecting in 1979 for their own future had they been simply extrapolating from past experience and not expecting any additional gains from the revolution they had just helped launch. Roughly speaking, they would have

expected their lifetime earnings to increase by 30 percent relative to their parents; instead they find it 15 percent lower. We believe that this gap of 45 percent between expectations and reality explains better this generation's frustrations with their economic circumstances than misperceptions regarding increased poverty, greater inequality, or continued economic decline.

Figure 11: Unfulfilled expectations: actual and projected cohort effects for the Revolution generation



Notes: The cohort effects and their 95% confidence interval are from Table 4 of appendix A. The trend line is based on the cohort effects for 1935-50.

This view also throws light on the unexpected outcome of Iran's recent presidential election. Many observers of Iran's political scene are puzzled by the recent shift toward populist, redistributive politics in Iran, coming as it has after five years of rising oil income and general economic growth. Some observers have attributed this apparent shift to rising poverty and widening gap between the poor and the rich.[7] But the evidence is firmly in support of a sharp reduction in poverty and no increase in inequality in recent years (Salehi-Isfahani 2006). We believe that the stagnation and loss in permanent income suffered by

[7]See, for example, Michael Ignatieff, "Iranian lessons," *New York Times*, July 17, 2005, and Afshin Molavi, *New York Times*, November 3, 2005 ("Today poverty, not prosperity, again propels Iran toward extremist politics").

some 20 cohorts of Iranians may be a greater source of voters dissatisfaction with the status quo than redistribution. If this interpretation is true, the post election emphasis on redistribution may not please the electorate as expected because it will not do anything to restore lifetime losses of the younger cohorts. Rather, by taking attention away from economic growth it may further widen generational gaps in lifetime earnings than they need to be.

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A Description of the surveys

The Household Expenditure and Income survey has maintained a consistent structure over the years. The questionnaires have changed in detail but all share the same basic modules. The first is the demographics module, which reports 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 expenditures; food expenditures can be aggregated into broader groups such as grains, meats, dairy, and so on. Module 4 reports on non-food expenditures, including non-durables and semi-durables such as clothing, household items, rent and utilities. 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.

Table 1: Sample sizes for households and individuals

Year	Households	Individuals	Earners
1984	27,148	144,062	32,230
1985	27,261	143,905	31,584
1986	5,760	30,923	5,186
1987	5,766	31,331	6,611
1988	7,837	43,469	8,930
1989	11,520	63,783	13,353
1990	18,439	101,530	26,129
1991	18,672	102,827	25,443
1992	18,671	100,093	26,531
1993	12,769	66,245	17,866
1994	19,909	104,370	27,237
1995	36,590	193,649	50,863
1996	21,964	113,827	32,403
1997	21,950	111,735	31,813
1998	17,477	89,035	25,891
1999	27,464	139,841	40,705
2000	26,941	132,708	39,303
2001	26,961	130,965	38,715
2002	32,152	153,114	45,413
2003	29,492	115,375	40,612
2004	24,552	112,774	35,775
Total	439,295	2,225,561	602,593

Table 2: Cell size for select cohort-year pairs of individuals

	Cohort										
Year	**1924**	**1929**	**1934**	**1939**	**1944**	**1949**	**1954**	**1959**	**1964**	**1969**	**1974**
1984	574	484	645	659	689	782	969	955	551		
1986	63	55	83	80	115	102	131	140	69		
1988	82	92	132	81	115	133	203	214	190		
1990	151	220	284	255	304	313	470	558	503		
1992	146	213	255	245	291	330	510	537	590	178	
1994		243	412	311	433	501	675	793	711	496	
1996		168	255	227	350	400	576	665	711	330	
1998		92	211	175	223	286	405	485	488	1019	659
2000			182	228	304	367	548	708	739	773	576
2002			233	276	337	441	693	828	897	1002	819
2004				260	372	297	584	736	797	860	770

Table 3: Cell size for select cohort-year pair of households

	Cohort										
Year	**1924**	**1929**	**1934**	**1939**	**1944**	**1949**	**1954**	**1959**	**1964**	**1969**	**1974**
1984	794	588	736	686	689	761	815	561	110		
1986	100	80	109	105	138	116	142	141	47		
1988	114	105	153	85	121	137	189	177	107		
1990	199	266	340	279	305	298	433	469	308	72	
1992	216	280	296	274	297	329	486	453	441	195	
1994		399	537	374	450	503	619	695	541	292	30
1996		255	372	285	385	389	550	609	577	459	112
1998		146	281	223	243	294	390	440	432	391	132
2000			275	300	364	398	549	668	667	675	355
2002			405	441	464	509	717	796	830	753	516
2004				412	536	381	682	716	743	769	629

Table 4: Decomposition regression: Dependent variable log individual earnings

Age dummies			**Cohort dummies**			**Year dummies**		
Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.	Variable	Coefficient	Std. Err.
aged_21	0.141	(0.038)	cohd_1935	0.025	(0.026)	yrd3	0.098	(0.012)
aged_22	0.385	(0.037)	cohd_1936	0.007	(0.026)	yrd4	-0.030	(0.012)
aged_23	0.555	(0.036)	cohd_1937	0.059	(0.025)	yrd5	-0.137	(0.012)
aged_24	0.765	(0.035)	cohd_1938	0.105	(0.025)	yrd6	-0.227	(0.012)
aged_25	0.796	(0.035)	cohd_1939	0.132	(0.025)	yrd7	-0.146	(0.012)
aged_26	0.912	(0.034)	cohd_1940	0.129	(0.025)	yrd8	-0.049	(0.012)
aged_27	0.951	(0.034)	cohd_1941	0.155	(0.025)	yrd9	0.008	(0.012)
aged_28	1.000	(0.034)	cohd_1942	0.147	(0.025)	yrd10	-0.026	(0.012
aged_29	1.076	(0.033)	cohd_1943	0.149	(0.025)	yrd11	-0.060	(0.012
aged_30	1.058	(0.033)	cohd_1944	0.170	(0.025)	yrd12	-0.197	(0.012
aged_31	1.139	(0.033)	cohd_1945	0.182	(0.025)	yrd13	-0.106	(0.012
aged_32	1.148	(0.033)	cohd_1946	0.211	(0.025)	yrd14	-0.050	(0.012
aged_33	1.171	(0.032)	cohd_1947	0.217	(0.025)	yrd15	-0.010	(0.012
aged_34	1.189	(0.032)	cohd_1948	0.256	(0.026)	yrd16	-0.056	(0.012
aged_35	1.152	(0.032)	cohd_1949	0.240	(0.026)	yrd17	-0.002	(0.012
aged_36	1.212	(0.033)	cohd_1950	0.285	(0.026)	yrd18	0.013	(0.012)
aged_37	1.249	(0.033)	cohd_1951	0.286	(0.026)	yrd19	0.090	(0.012)
aged_38	1.246	(0.033)	cohd_1952	0.274	(0.026)	yrd20	0.138	(0.012)
aged_39	1.276	(0.033)	cohd_1953	0.283	(0.026)	yrd21	0.195	(0.012)
aged_40	1.207	(0.033)	cohd_1954	0.294	(0.026)			
aged_41	1.275	(0.033)	cohd_1955	0.297	(0.026)			
aged_42	1.293	(0.033)	cohd_1956	0.293	(0.027)			
aged_43	1.293	(0.033)	cohd_1957	0.299	(0.027)			
aged_44	1.299	(0.034)	cohd_1958	0.272	(0.027)			
aged_45	1.223	(0.034)	cohd_1959	0.252	(0.027)			
aged_46	1.283	(0.034)	cohd_1960	0.264	(0.027)			
aged_47	1.328	(0.034)	cohd_1961	0.270	(0.027)			
aged_48	1.287	(0.034)	cohd_1962	0.257	(0.027)			
aged_49	1.292	(0.034)	cohd_1963	0.261	(0.027)			
aged_50	1.235	(0.034)	cohd_1964	0.257	(0.028)			
aged_51	1.281	(0.034)	cohd_1965	0.257	(0.028)			
aged_52	1.267	(0.035)	cohd_1966	0.189	(0.028)			
aged_53	1.245	(0.035)	cohd_1967	0.226	(0.029)			
aged_54	1.250	(0.035)	cohd_1968	0.208	(0.029)			
aged_55	1.188	(0.036)	cohd_1969	0.188	(0.029)			
aged_56	1.199	(0.036)	cohd_1970	0.140	(0.030)			
aged_57	1.192	(0.036)						
aged_58	1.200	(0.037)						
aged_59	1.164	(0.037)						
aged_60	1.143	(0.038)						
aged_61	1.041	(0.039)						
aged_62	1.050	(0.040)						
aged_63	1.011	(0.041)						
aged_64	0.936	(0.042)						

$N = 735 \quad R^2 = 0.94$