# 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 changes in earnings and consumption 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 1920s to as late as 1970s. 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. Our analysis also shows that losses in lifetime earnings are mainly concentrated in the less educated cohorts. In contrast to earnings, per capita expenditures and income indicate rising cohort trends, which we interpret to mean that transfers between generations and from the government more than compensated for the loss of individual earnings of the younger cohorts.

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# 1 Introduction

Iran has experienced huge shocks to its economy in the last three decades. The Islamic 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 the fact that in real terms average per capita income in 2005 was about the same as it was at the height of the 1970s oil boom, which for most Iranians represents the golden age.[1] Furthermore, in recent years poverty has declined substantially and the distribution of income has improved substantially compared to the 1970s (Salehi-Isfahani 2008). The frustrations Iranians express regarding their present economic conditions and the 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; Hechman and Robb 1985; Gosling, Machin, and Meghir 2000; Mckenzie 2006a; Mckenzie 2006b; Shorrocks 1975; Skoufias and Suryahadi 2002), and in labor supply (Farkas 1977; Clogg 1982; Beaudry and Lemieux 1999; Attanasio, Low, 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 1924 and those born as late as 1979. By decomposing changes in average earnings (or consumption) into changes that can be attributed to age, period, and cohort effects, we are able to identify changes in permanent income or consumption (cohort effects) for cohorts who lived and worked mostly before the Revolution to those whose adult life has been mainly 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 our decompositions 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, but show a distinct declining trend for later cohorts born in the 1960s, who reached adult life after the Revolution. We also consider changes in individual welfare based on cohort effects estimated from per adult equivalent household income and expenditures, which, in addition to earnings, include transfers within the household and from the government. We find that, in contrast to individual earnings, these cohort effects rise continuously for all cohorts. We interpret this finding to mean that, possibly as a result of transfers between generations and from the government, lifetime welfare may have increased even for the cohorts who have lost in terms lifetime earnings.

The plan of this paper is as follows. Section 2 provides a brief overview of the macroeconomic shocks in the last three decades. Section 3 describes the micro data, and section 4 our

decomposition methodology. Section 5 presents the empirical results for individual earnings and section 6 for per capita household income and expenditures. Section 7 concludes and discusses the implication of our findings for Iran's political economy.

## 2 The Iranian Context

The Islamic Revolution interrupted the longest period of economic growth in Iran's history that 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).[3] The economic collapse of the 1980s, coming as it did after 25 years of steady improvements in the standard of living, is one reason why today there exists a widespread feeling of lost fortunes as a result of the Revolution, even though, as measured by *average* indicators, economic growth since the end of the war with Iraq in 1988 has erased most of those losses. 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 (1980-88) and following the collapse of oil prices in 1986. By 1987, GDP per capita was down by about 50% compared to its peak in 1975. They also show how the pace of economic recovery since 1989 depended on the rise of oil prices. 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.[4] The macro data in Figure 1 also show 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 form the basis for the calculation of the consumption data in macroeconomic indicators in Figure 1. So naturally, they track them well as seen in Figure 2. This figure also shows that earnings have fluctuated more widely than consumption, and that rural households have been for the most part shielded from the fluctuations. All series show declining real individual earnings and household expenditures until 1988 and slow recovery since then.

## 3 Survey Data

We use of 21 rounds of the Household Expenditures and Income Surveys (HEIS) conducted annually by the Statistical Center of Iran (SCI) to tracks cohort earnings and consumption. The surveys have been conducted since 1963 but only those for 1984-2004 have been made available to us in unit record. New samples are drawn each year for these surveys, so they do not form a panel and it is not possible to track individuals or households over time. Because these surveys are used to construct national macroeconomic statistics, SCI spends considerable resources in collecting them. They are scrutinized carefully and are therefore highly consistent over the years. The focus of the surveys is on expenditures, which are collected in impressive detail, but they also contain 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 these surveys ranges from a low of 5,700 households in 1986-87 (the worst years of the war) to 36,500 in 1995 (just before the 1996 census). Despite the variation in sample size, the surveys have remained nationally representative. This is the case even for the war years during which war ravaged provinces were sampled proportionately. The number of individuals covered varies from about 37,000 in 1986 to over 193,000 in 1995 (see Table 2 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 households divided by five. We use probability sampling weights in all the estimation in this paper.

To construct our pseudo panel we define cohorts by their birth year and extract their earnings from consecutive surveys. We include in the sample all individuals who report income from wages and self employment but exclude non-earners. Table 7 shows the proportion of earners for five-year cohorts across age groups. For men these proportions have

remained quite stable for all cohorts at the same age, except for the 50-54 year olds for whom the proportion of earners declined across cohorts.[5] For women, there is a bit more variation; the cohorts born after 1969 had a higher proportion with positive earnings when they were 20-24 years old compared to older cohorts. This means that the decline in cohort effects noted below are in part the result of fewer women earning an income which lowers the cohort average.

Not all cohorts are observed for the same length of time. The youngest cohort to be observed for the entire 21 years of surveys was born in 1964; it was first observed in 1984 and last in 2004. The youngest cohort in our sample was born in 1979 and was only observed for 5 years, 1999-2004. 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). 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 first line on the left is average earnings of all individuals born in 1969, whom we can observe from age 15 (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 second line from the left shows the earnings for the cohort of men born in 1964 and observed between ages 20-40, and so on. The last line to the right belongs to the 1934 cohort whom we observe for 21 years but is in our empirical sample for 15 years only, from age 50 to 64 (between 1984 and 1998). If cohorts had lived through a long period of economic growth, as they did in Taiwan (Deaton 1997, p. 118), the lines representing cohort earnings would not cross each other; the profiles for younger cohorts would lie to the left and above older cohorts. In Iran, the large economic decline of the 1980s appears to have hurt nearly all cohort's earnings, though at different points in their lives, and caused the line representing earning profiles in Figure 4 to cross.

# 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) and Deaton and Paxson (1994), and 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 cohort 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 $\alpha_a$ is the age effect for age $a$, $\gamma_c$ is the cohort effect for cohort $c$, and $\psi_t$ 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 $\alpha_a$, $\gamma_c$, $\psi_t$. Given that we have no a priori information on the period effects, the best way to estimate $\gamma_c$ 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.[6] 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 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. We follow (Deaton 1997) by normalizing the period effects to sum to zero and the year effects orthogonal to the time trend.[7]

# 5 Decomposition of individual earnings

We analyze the decomposition of earnings of men and women separately because of their very different labor market behavior. Women are about one fourth as likely to report earnings (Table 7), and their share of the labor force is very low, about 10 percent for the cohorts born in 1930s and 20 percent for cohorts born in 1970's. As a result, the number of observations in cohort-year cells for women is quite small, so the decomposition for women is less precisely estimated than men. Because social norms in Iran still conform to the one-breadwinner model, we believe that men's earnings reflects better the changing fortunes of generations through the upheavals of revolution and war, so for in this section our focus is on men. We define earnings as net wage and salary income plus net income from self employment, as do (Beaudry and Green 2000), because our interest is in how total cohort earnings have changed rather than just income from wage and salary. We use the Consumer

Price Index published by the Central bank of Iran for urban areas and by the Statistical Center of Iran for rural areas to measure real earnings in 1995 prices.

We present our decomposition results in sets of four graphs, as in Figure 4 for men. To save space, we do not report the estimation results behind each set, except for the case of men for which the detailed estimation results are presented in Appendix Table 5.[8] We report 95 percent confidence band for the estimated coefficients in each graph. In the top left corner graph we reproduce the actual cohort profiles as they appear in the data before any decomposition (this panel corresponds to Figure 3 which was for men and women). These are the raw data which we decompose into age, period, and cohort effects. The period effects are quite visible in the shape of the actual earnings profiles, especially the effect of the big collapse of the 1980s. Cohort and age effects are difficult to discern from this graph, for which we turn to the results of decomposition depicted in the three other panels.

The estimated age effects for men, shown in the top right corner of Figure 4, exhibit the familiar inverted U-shape. Incomes rise sharply until about age 30 and peak at 45 before gently declining. This is in contrast to the age profile for Taiwan (Deaton 1997, p. 118) and Indonesia (Skoufias and Suryahadi 2002), wherein incomes rise continuously even past age 50. In Iran, according to our estimates, between ages 20 (which we assume is the average entry point into the labor market) and 30 earnings increase by about 50 percent, and then flatten out. This pattern suggests low returns to experience in Iran's labor market, certainly compared to Taiwan and Indonesia. This pattern holds for those with high and low education (see below). For women, the age effects do not show the steep rise in the early years and, surprisingly, are flat between the ages of 25 and 40, after which they decline, indicating no returns to experience (Figure 5).

The year effects for men and women, shown in the bottom right corner of Figures 4 and 5, are nearly identical. 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 for men, which are of greatest interest to us, are in the bottom left corner of Figure 4. There is a clear positive cohort effect for successive generations born before 1950, who were mature adults and well into their careers (30 years and older) at the time of the Revolution in 1979. For the cohorts born around the middle of the last century lifetime earnings were about 50 percent higher compared to the generation before (born around 1925-30). For the generation born between 1950-64 and therefore young in 1979 (15-29 years old), the cohort effects indicate no improvement in lifetime earnings. The most striking result, however, is the decline in lifetime earnings of the youngest cohorts, born after the mid 1960s, who reached labor market entry age after the Revolution (the Revolution generation). For example, the cohorts born in the mid 1970s shows a decline of more than 20 percent in lifetime earnings (significant at the 5% level) compared to those born in 1964-65. The cohorts born after 1970 had the same lifetime earnings as those born 30 years earlier. Put more strikingly, in terms of lifetime earnings the Revolution generation seems to have fared worse than their parents (born 25-30 years earlier). We notice a similar pattern for women, though the estimates are less precise because of the much smaller number of observations.

Similar declines in cohort fortunes have been documented for developed countries, but mostly for a particular skill group and in relation to shifts in demand for certain types of skills. For example, (Beaudry and Green 2000) show that cohort-specific age-earnings profiles for Canadian men have shifted down for successive cohorts since the 1978 entry cohort for high school educated men and from even an earlier point for university educated men. They reports a 20 percent decline in earnings for those entering the labor market in 1992 compared to cohorts who entered 20 years earlier, which is similar in magnitude to what

we find here. However, studies for other countries have found rising cohort effects. Gosling, Machin, and Meghir (2000) shows a rising pattern for UK, as do Deaton and Paxson (1994) and Skoufias and Suryahadi (2002) for developing countries. In particular, the latter show that it is mainly the younger cohorts that have reaped the benefits of growing employment and wages in the formal sector.

Although the earnings outcome looks bleak for the younger cohorts of Iranians in our sample, our analysis of household level income and expenditures below reveal an entirely different picture. As we show below in section 6, in terms of consumption there has been no interruption in the rising trend. The younger cohorts are actually better off than their parents, possibly because of greater intra family transfers and government subsidies in the post Revolution period. However, to the extent that a person's self worth is measured by his or her own earnings, the Revolution generation may still feel worse off compared to their parents, which is important to consider when squaring reports of malcontent among Iranians with Iran's solid macroeconomic growth in the last decade. Before moving on to household level income and expenditures, we consider the role of education.

### 5.1 Education

The decline in lifetime earnings of the younger cohorts reported above has occurred despite rising education. 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. This observation is consistent with several interpretations, including falling returns to education or declining quality of education. There has been a significant expansion of education in recent decades which may have failed to increase the productivity of the educated (Salehi-Isfahani 2005 and Salehi-Isfahani 2008), a phenomenon which is not unique to Iran (Pritchett 2001). There is evidence that the post-Revolution governments in Iran have focused more on quantity than quality of education. As the baby boom of the

1980s passed through, first primary schools and then later middle schools had to go to more than one shifts per day (some primary schools even has three shifts per day), which could not have been good for quality. There is also the possibility that Iran's rigid labor market has failed to require more than diplomas from the young, so letting quality to deteriorate for reasons other than government resource constraint. Credentialism has boosted the supply of high school and university graduates in search of jobs in the public sector, thus lowering returns to these degrees. The decline in the quality of university graduates is possibly more significant, though their numbers are not large (about 7 percent of total in 2004 in the 25-29 age group). This is especially true for the cohorts born in the mid-1960s and later who reached university age at a particularly bad time for higher education when the Iraq war and the Cultural Revolution had disrupted university life. As part of the Cultural Revolution universities were closed for two academic years during 1981-83, and many faculty deemed un-Islamic were purged. In addition, and as a result of these developments, many of the country's most talented graduates left the country.

We capture the role of education in earnings in two ways. First, we perform a counterfactual analysis of male earnings to find out how lifetime earnings would have changed had education remained the same. Second, we do the decomposition for cohorts of men with low and high education to see if education was a savior of some kind for the younger cohorts who acquired more of it.

We 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 changes in education. As expected, the results show an even more dramatic decline in cohort earnings for the youngest cohorts (presented in Figure 8). 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. This result indicates a decline in either the quality of education or in its rewards for the younger cohorts.

Next we divide or sample into those with basic education (lower secondary and below) and those with high education (upper secondary and above). The latter group's share in the total population increased from 7.4 percent in 1984 to 22.8 percent in 2004. This division is the most logical to make because high school and college degrees are considered the only terminal degrees in Iran, and because the main output of Iran's education system in recent decades has been the production of these two diplomas (Salehi-Isfahani and Egel 2007). Dividing the sample into more categories is not fruitful because those with a basic education appear to have had a similar cohort experiences, and the decomposition becomes unstable if we further divide the high educated group. As before, we checked for selection into the sample of income earners and decided that it is unlikely to be a problem since the proportion of earners remained constant during the period of this study. The proportion of low educated men reporting income stayed between the 84-87 percent range while that of the high educated group fluctuated between 71-74 percent, neither with any trend.

The results of the decomposition for men for the two education groups are quite different. The cohort and age effects for those with a basic education are similar to those for all men, except that the decline in lifetime earnings for younger cohorts appears even sharper than for all men (Figure 6). This group increased its average years of schooling from 2.4 in 1984 to 4.5 years n 2004, but obviously it was not sufficient to prevent the tide of declining earnings. The cohort effects for educated men, shown in Figure 7, are rather flat, which is different from the less educated and from the results for all men, and somewhat of a good outcome for them. Because of the small sample size the estimates for the educated group are less precise, so we cannot reject the hypothesis that cohort effects are actually lower for the more recent cohorts. But the divergence in the experience of the two groups is still noteworthy because it suggests a reason for the stability of Iran's inequality (Salehi-

Isfahani 2008) despite impressive increase in access to basic education. The differences in the decompositions results is consistent with the rising gap in earnings by education from cross section data. During the period of economic recovery since 1989, real earnings of men with basic education has grown on average by 1.3 percent per year, compared to 2.3 percent for upper secondary and 3.4 percent for tertiary degree holders (see Table 6 in Appendix). In view of the cross section and decomposition results, it is quite likely that private returns to basic education have declined relative to upper secondary and tertiary education. The widening of the gap in lifetime earnings based on education may result in part from the fact that the educated work mainly for the public and formal sectors where earnings are better protected, and the less educated work mainly in the private and informal sectors where they are subject to increasing competition Salehi-Isfahani (2005).

## 6 Decomposition of per capita income and expenditures

Changes in individual earnings are important to understand for a variety of reasons, but they do not always reflect changes in economic welfare for at leat two reasons. Individuals benefit from being part of a household and share in its resources, and they may benefit from transfers from the government to households in the form of subsidies and in-kind payments. There is evidence of significant consumption smoothing through intergenerational transfers within households. A high and rising proportion of young people live with their parents well into their twenties. This is probably related to lower earnings as well as their inability to find a steady job which seems a precondition for forming their own household (Salehi-Isfahani and Egel 2007). 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 9). 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 their only source of support. Government transfers also play a significant role in boosting individual welfare in Iran. the government spends a hefty 10 percent of the GDP on subsidies to food, fuel, and medicine. Our calculations from the HEIS data files reveal that 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.

To account for the effect of resource pooling within the household, as well as transfers from the government, we use household level income and consumption rather than individual earnings to measure changes in the lifetime economic welfare of individuals. As before, our sample includes individuals who live with their parents as well as those who are heads of households, but here instead of their individual earnings we ascribe to each individual the level of per adult equivalent income or expenditures (defined by division with the square root of household size) that prevails in the household they live. An important difference with the earnings decomposition is that here, by design, we are considering all individuals and not just those with positive earnings. We are also combining here men and women because with per capita values the distinction is much less important than with individual earnings. Previous works in the literature have defined cohorts based on the age of the household head (see Deaton and Paxson 1994 and Mckenzie 2006b), which introduces a potential selection bias if, plausibly, the young adults who live with their parents and are therefore excluded from the sample happen to be less well-off. The results of decomposition using either basis for defining age are remarkably the same.

We present the results of decomposition of per adult equivalent income and expenditures in Figures 11 and 10. Despite the fact that, as noted earlier, reporting of household income in HEIS is less accurate than expenditures, and the correlation between the two in each survey is less than close, the two decompositions produce nearly identical results. The age

profiles in these figures are similar to the age profile of consumption reported in Deaton (1997, p. 118) for Taiwan, in that they do not have the inverted U-shape we observed for individual earnings of men and women in section 5 above. The rising age profiles observed in these graphs could be for several reasons. The may reflect the fact that household resources increase with age and because later in life children leave the household thus raising per capita expenditures, or some who stay add to household income. In 2004, the smallest households with 2.45 members were those headed by 20 years olds, the largest with 5.61 members were headed by 49 year olds, and the oldest households had 4.4 members.

The more interesting difference between the decomposition of per adult equivalent expenditures and individual earnings in the shape of the cohort effects. Cohort effects rise monotonically instead of the inverted U-shape. We interpret rising cohort effects in per capita household resources to mean that the lost ground in individual earnings for the younger cohorts have been partly compensated for by transfers within the household and from the government. Interestingly, sometime around 1950 we notice a change in the slope of the linear trend in the cohort effects for both income and expenditures, which corresponds to the time when cohort effects for earnings stop rising. This may be an indication that transfers did not fully compensate for falling earnings.

## 7 Discussion and concluding remarks

In this paper we examine changes in lifetime earnings and consumption of Iranians who have lived through the tumultus last three decades. We find evidence 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, we also find that the younger cohorts born after 1960, who were in their late teens or early twenties in 1979–the Revolution generation–lost in terms of lifetime real earnings 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. Several explanations are 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 with accuracy about these cohorts because they have only recently entered the labor market and we have just begun to observe them in our surveys. 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 that labor market conditions during the early years of a person's career are critical for his or her human capital accumulation is very intuitive. Much is learned on the job and long periods of unemployment can quickly depreciate a young person's skills. 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 in terms of human capital. Universities in Iran provide much incentive for all schooling. They were closed for two full academic years 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 returns to education after the Revolution.

We also analyze changes in household resources over time and find that, assuming equal access to family resources, the cohort effects for per adult equivalent values of household

income and expenditures increased even as individual earnings showed the opposite. We offer an explanation to reconcile the two sets of results by noting that transfers from the older generation to the new and from governments to households have helped not only maintain lifetime consumption but also to increase it. In light of this finding, and the fact that average cross section incomes in Iran have recovered from their post-Revolution collapse, the nostalgia that many Iranians feel for pre-Revolution times and the strength of the widely held view of general economic decline in Iran is rather surprising (Salehi-Isfahani 2008). One explanation for the persistence of economic discontent among younger Iranians may be that transfers from parents and the government are not a good substitute for earning an income and feeling productive. Furthermore, as we have shown, for a long succession of Iranian cohorts lifetime earnings were on the increase, generating the sort of optimism that comes with seeing one's parents do better than their parents, and believing that in turn the same will hold true for them. The Revolutionary upheavals, the war, and the largest oil price collapse in history, appear to have sharply reversed this trend. The cohort evidence shows that the young revolutionaries in their late teens and early twenties and full of Revolutionary optimism around 1979 were precisely those who were hit the hardest the reversal of fortunes. 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. This is not true for this group of young Iranians. To gauge the extent of their disappointment imagine a trend line that projects forward the rising cohort effects of the early decades, placing the lifetime earnings of the Revolution generation about 30 percent higher than their parents. Instead, it turned out to be 20 percent lower, which is half of what they might have expected.

## Notes

[1]For example, a The Washington Post reporter, obviously impressed by what interviewees told him, wrote that, "In real terms, Iranians earn one-fourth of what they did earn [before the 1979 Revolution]," "Economic Ills Fuel Iranian Dissent," *The Washington Post,* July 8, 2003, A. 13. For more examples of

reports of dire economic conditions see Salehi-Isfahani (2005) and 2006.

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

[3]For surveys of Iran's macroeconomic conditions, see Amuzegar (1993), Jalali-Naini (2005), Pesaran (2000).

[4]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.

[5]We tried the decomposition with non-earners included, which lowers the average earnings but does not change the results because the proportions of earners is stable across cohorts for a given age group.

[6] 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.

[7] This normalization 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). 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. 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).

[8]The details of all estimation results are available upon request.

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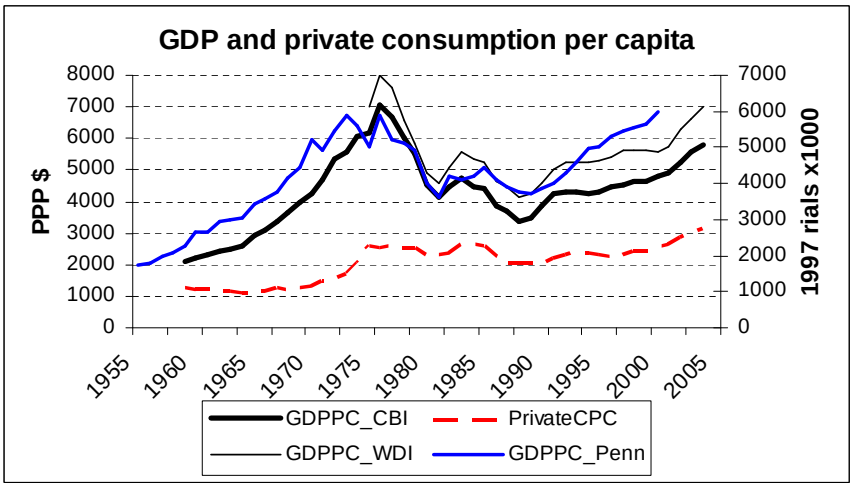
Table 1: Proportion of men and women with reported earnings, by cohort and age

| Age | 1939-43 | 1944-48 | 1949-53 | 1954-58 | 1959-63 | 1964-68 | 1969-72 | 1974-78 |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| 20-24 | | | | | 0.671 | 0.589 | 0.663 | 0.661 |
| 25-29 | | | | 0.912 | 0.862 | 0.888 | 0.880 | 0.853 |
| 30-34 | | | 0.957 | 0.951 | 0.961 | 0.956 | 0.950 | 0.958 |
| 35-39 | | 0.965 | 0.962 | 0.972 | 0.967 | 0.961 | 0.966 | |
| 40-44 | 0.959 | 0.968 | 0.967 | 0.966 | 0.961 | 0.944 | | |
| 45-49 | 0.952 | 0.957 | 0.950 | 0.951 | 0.968 | | | |
| 50-54 | 0.921 | 0.901 | 0.878 | 0.848 | | | | |
| 55-59 | 0.846 | 0.802 | 0.800 | | | | | |
| 60-64 | 0.703 | 0.709 | | | | | | |
| | | | | | | | | |
| Women | | | | | | | | |
| 20-24 | | | | | 0.083 | 0.092 | 0.167 | 0.159 |
| 25-29 | | | | 0.132 | 0.121 | 0.180 | 0.204 | 0.187 |
| 30-34 | | | 0.125 | 0.139 | 0.192 | 0.201 | 0.202 | 0.183 |
| 35-39 | | 0.087 | 0.130 | 0.208 | 0.202 | 0.196 | 0.171 | |
| 40-44 | 0.084 | 0.124 | 0.199 | 0.213 | 0.197 | 0.209 | | |
| 45-49 | 0.089 | 0.177 | 0.190 | 0.183 | 0.196 | | | |
| 50-54 | 0.138 | 0.160 | 0.161 | 0.153 | | | | |
| 55-59 | 0.137 | 0.130 | 0.124 | | | | | |
| 60-64 | 0.097 | 0.116 | | | | | | |

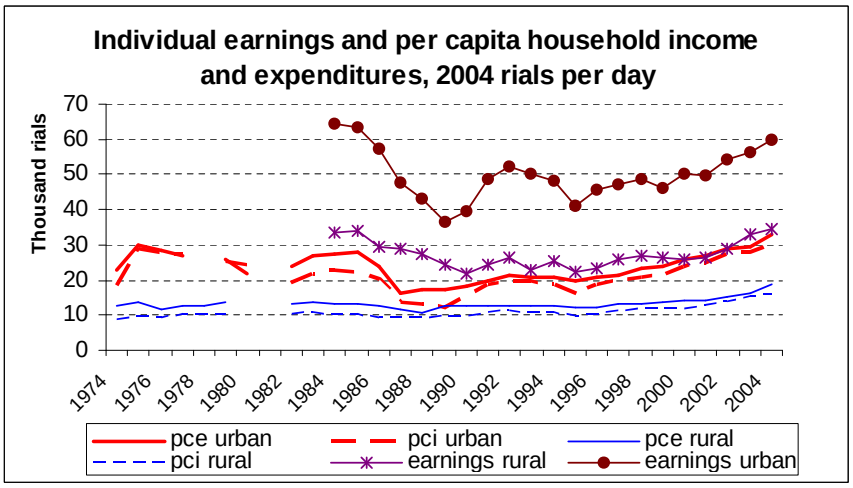
Source: Authors's calculations, HEIS data files

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.

Figure 2: Fluctuations in individual earnings and average per capita household income (pci) and expenditures (pce), 1984-2004




Source: Before 1984, Statistical Center of Iran; 1984-2004, authors' calculations from HEIS data.

Figure 3: Average real individual earnings by cohort

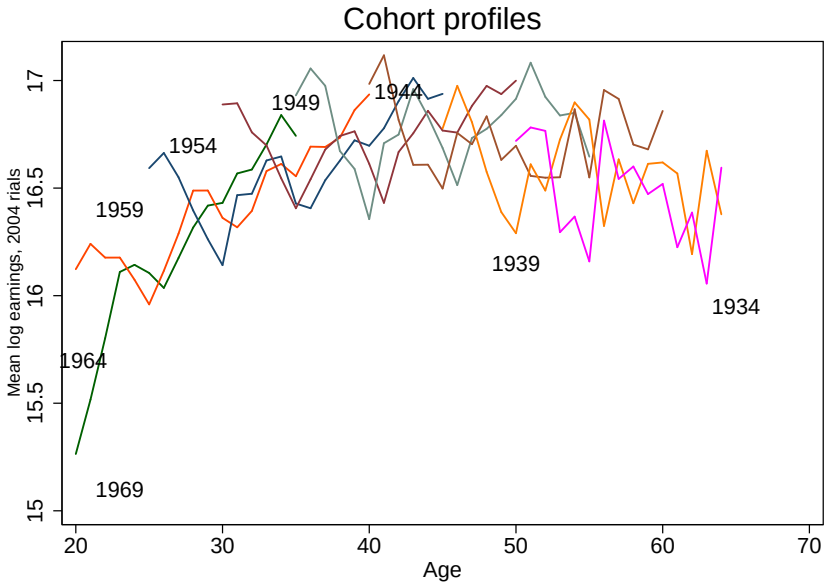


Figure 4: Decomposition of real individual earnings of men

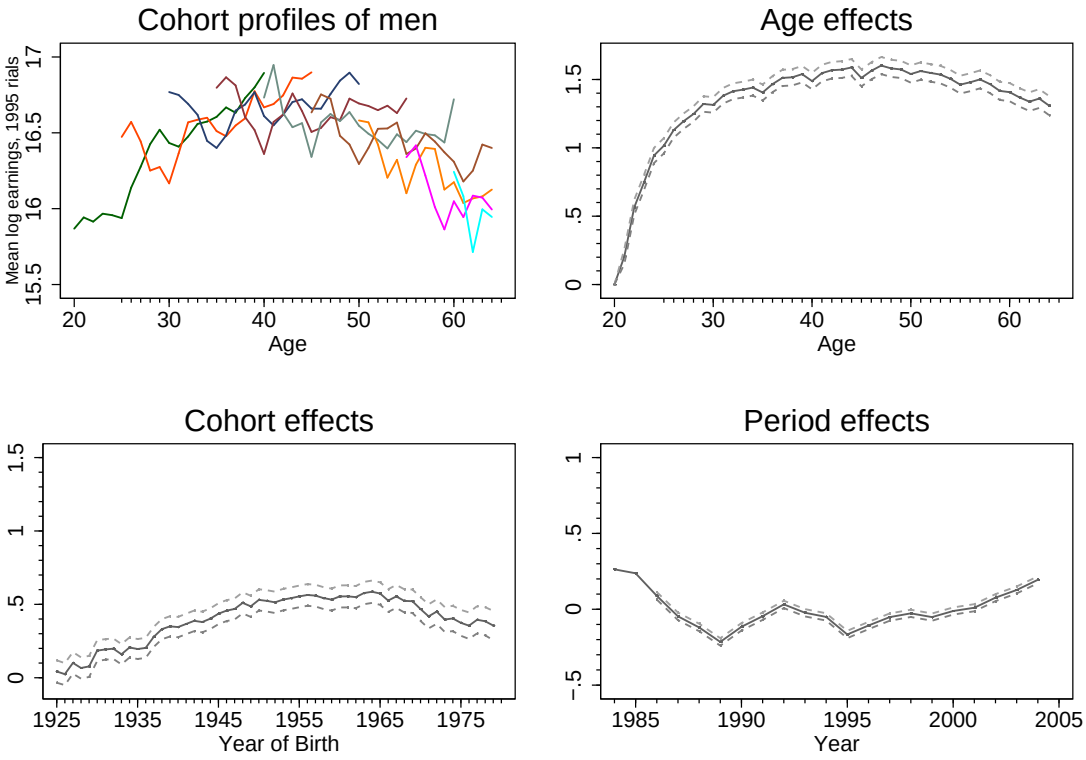


Figure 5: Decomposition of real individual earnings of women

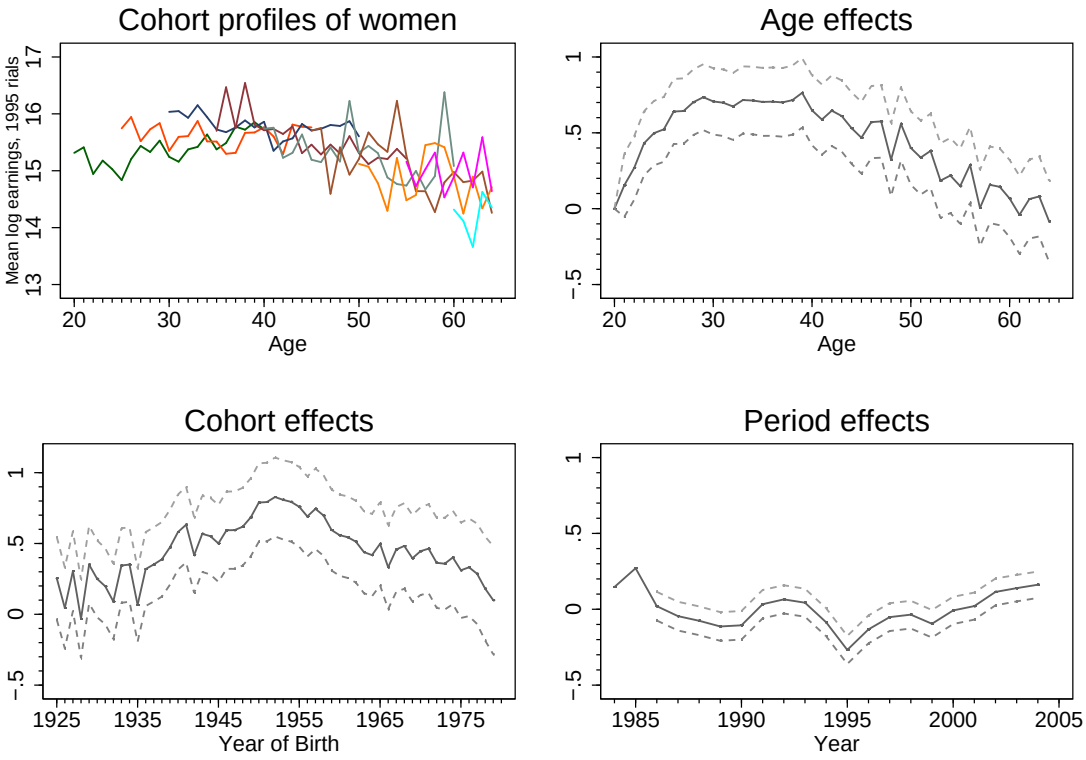


Figure 6: Decomposition of individual earnings of men with less than a high school education

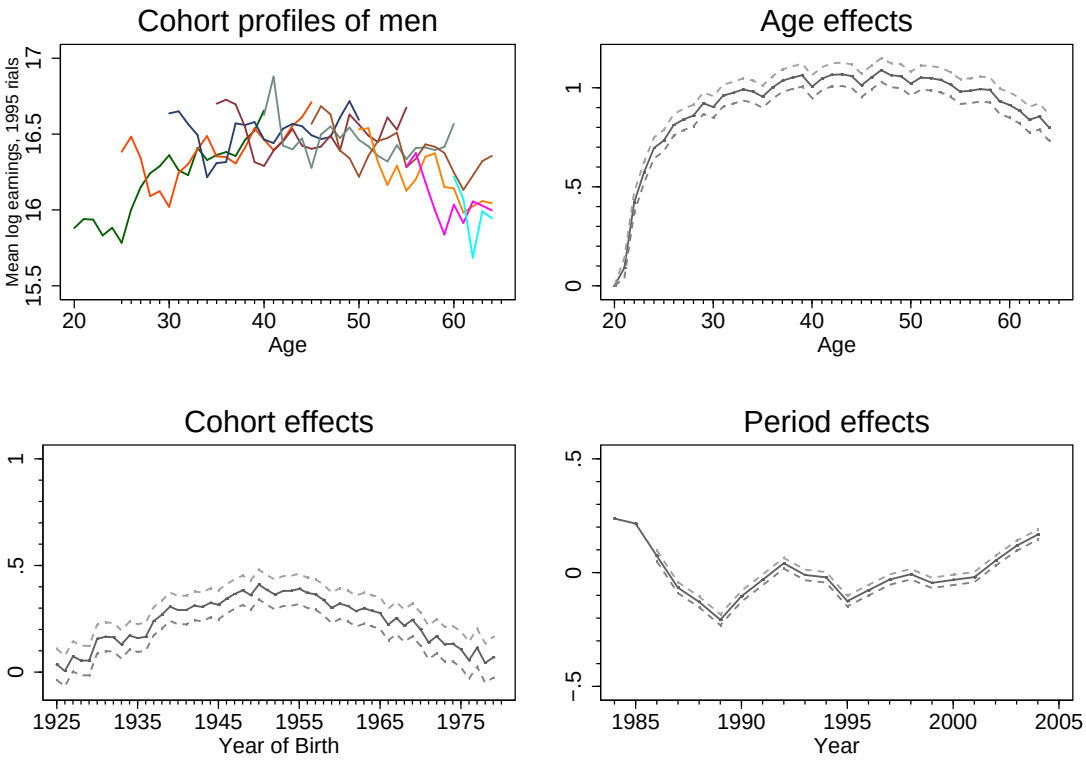


Figure 7: Decomposition of individual earnings of men with a high school education and above

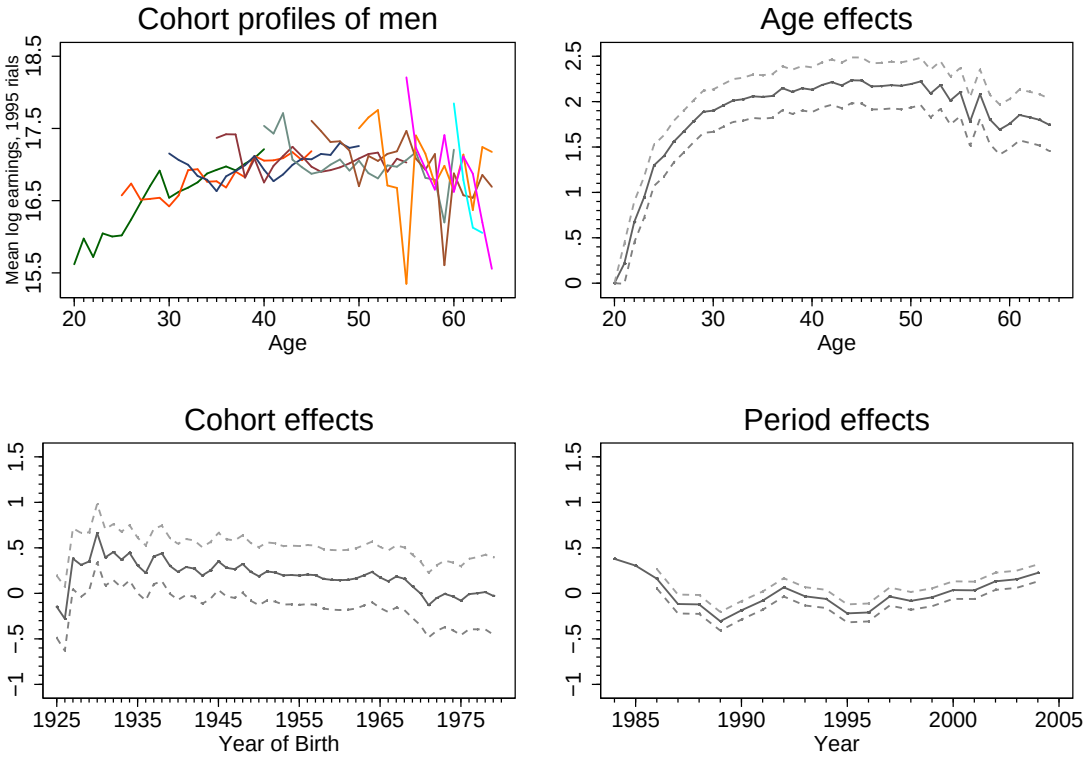


Figure 8: Decomposition of individual earnings for men controlling for education

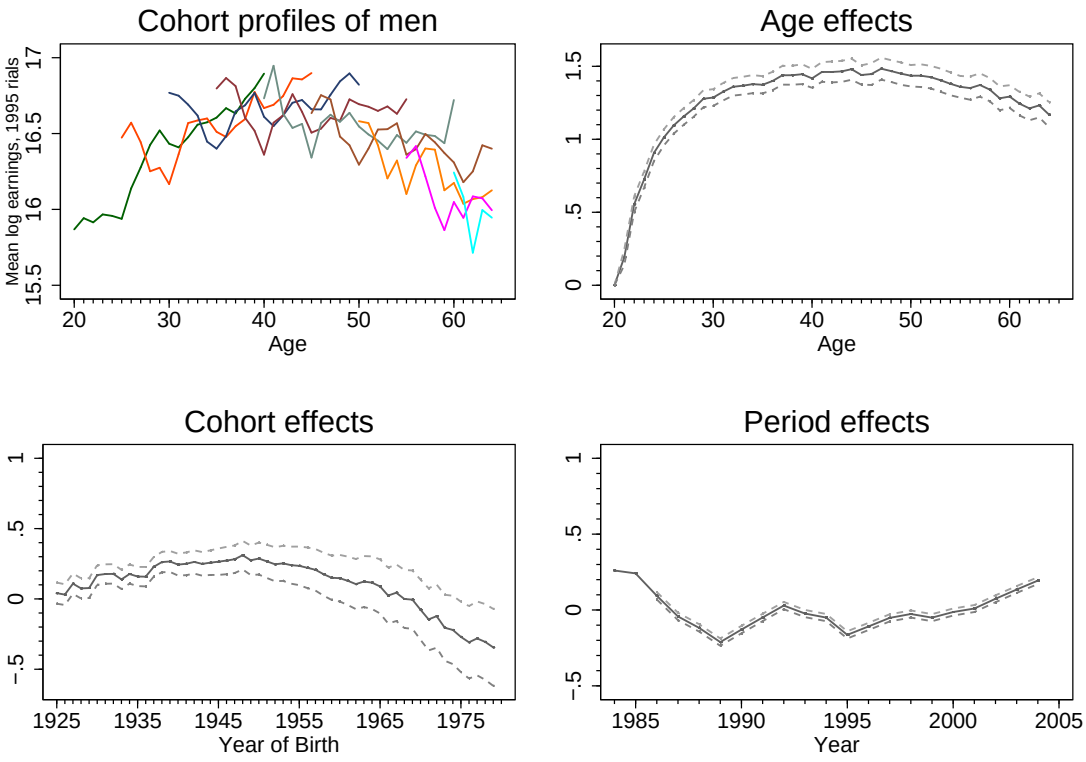



Figure 9: The declining ability of the young to form households

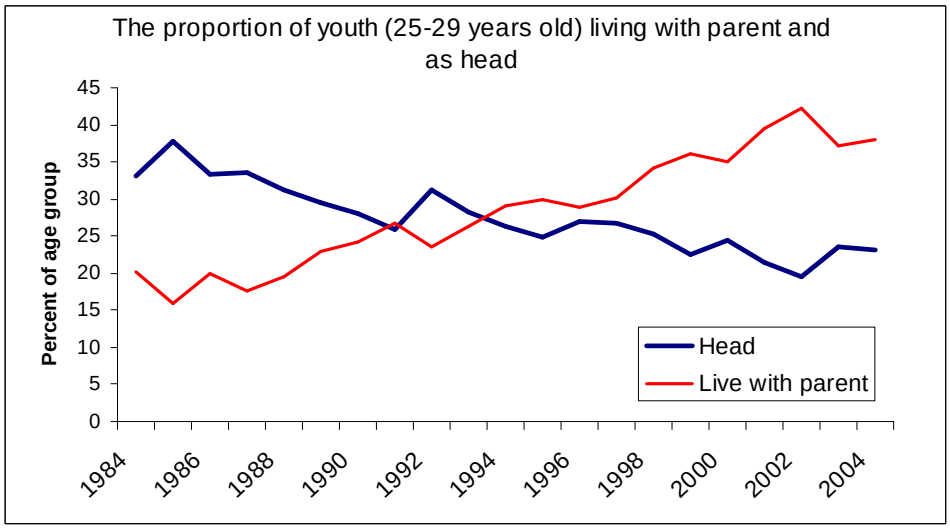


Figure 10: Decomposition of real per adult equivalent household income

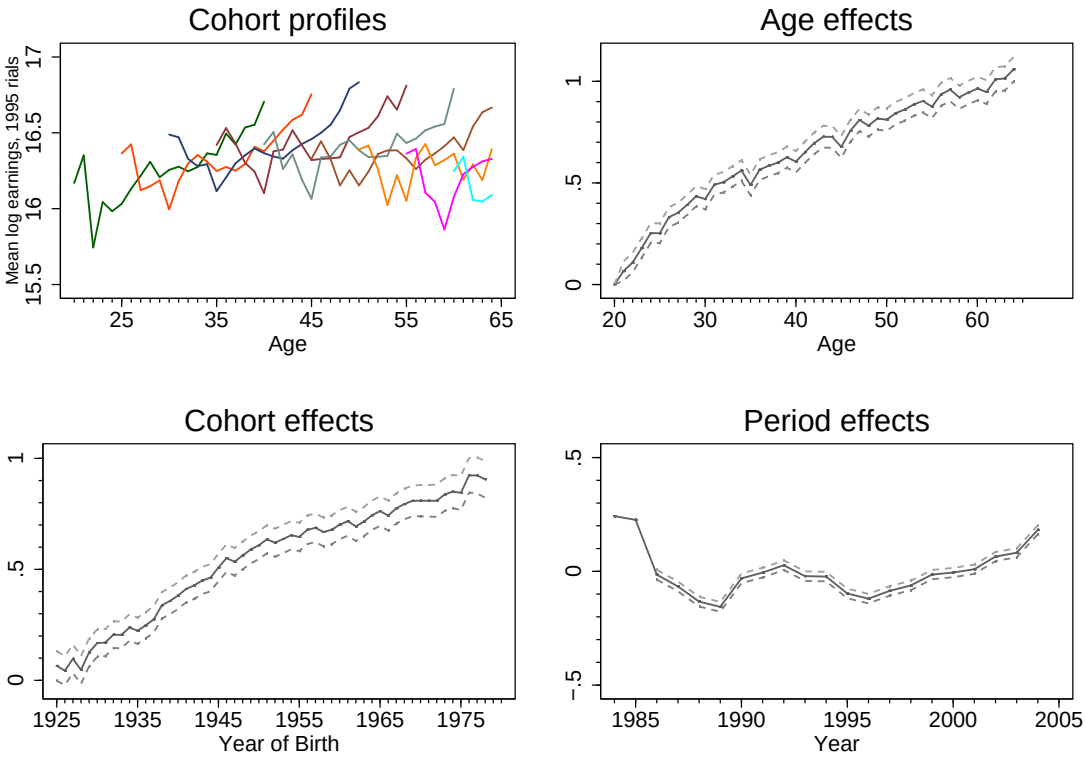
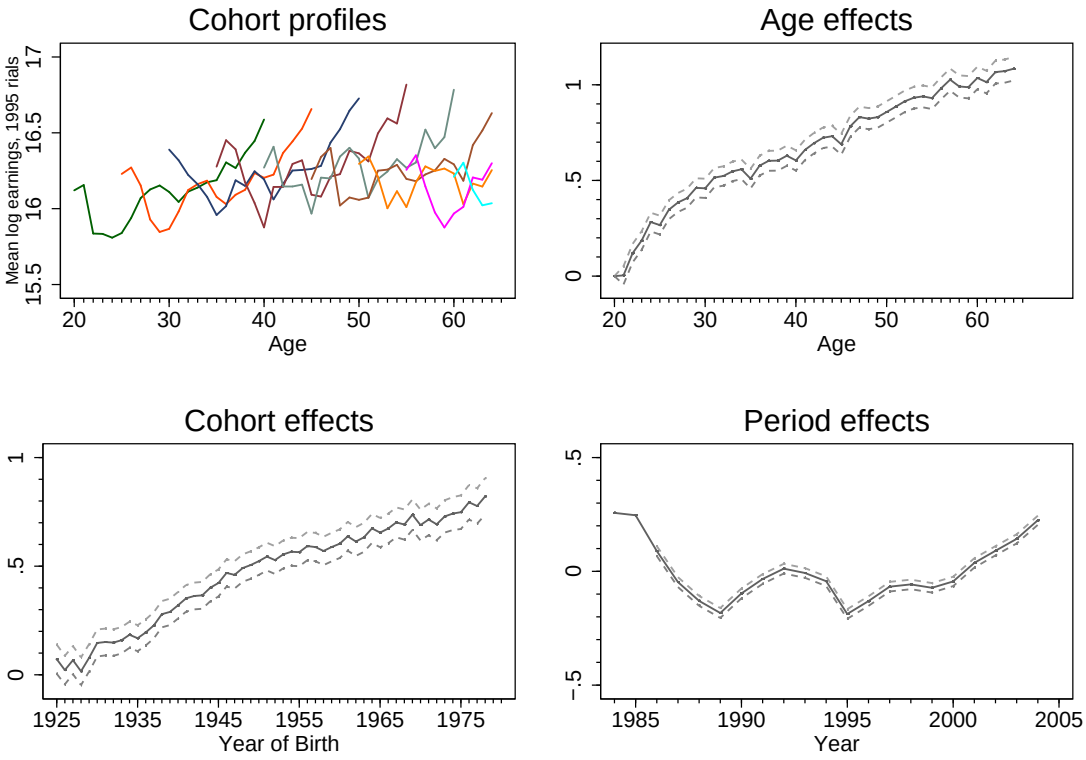


Figure 11: Decomposition of real per adult equivalent household expenditures



# A Appendix

## 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 2: 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 3: 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 4: 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 5: Decomposition regression of earnings of men: 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 | 0.205 | (0.027) | cohd_1935 | 0.196 | (0.034) | yrd3 | 0.089 | (0.012) |
| aged_22 | 0.564 | (0.027) | cohd_1936 | 0.203 | (0.034) | yrd4 | -0.046 | (0.012) |
| aged_23 | 0.748 | (0.028) | cohd_1937 | 0.279 | (0.034) | yrd5 | -0.120 | (0.012) |
| aged_24 | 0.944 | (0.028) | cohd_1938 | 0.331 | (0.034) | yrd6 | -0.215 | (0.012) |
| aged_25 | 1.015 | (0.028) | cohd_1939 | 0.350 | (0.035) | yrd7 | -0.115 | (0.012) |
| aged_26 | 1.130 | (0.028) | cohd_1940 | 0.345 | (0.035) | yrd8 | -0.046 | (0.012) |
| aged_27 | 1.195 | (0.028) | cohd_1941 | 0.366 | (0.035) | yrd9 | 0.032 | (0.012) |
| aged_28 | 1.247 | (0.028) | cohd_1942 | 0.388 | (0.035) | yrd10 | -0.023 | (0.012 |
| aged_29 | 1.321 | (0.028) | cohd_1943 | 0.380 | (0.035) | yrd11 | -0.050 | (0.012 |
| aged_30 | 1.315 | (0.029) | cohd_1944 | 0.403 | (0.035) | yrd12 | -0.166 | (0.012 |
| aged_31 | 1.381 | (0.029) | cohd_1945 | 0.436 | (0.036) | yrd13 | -0.107 | (0.012 |
| aged_32 | 1.414 | (0.029) | cohd_1946 | 0.457 | (0.036) | yrd14 | -0.052 | (0.012 |
| aged_33 | 1.426 | (0.029) | cohd_1947 | 0.469 | (0.036) | yrd15 | -0.027 | (0.012 |
| aged_34 | 1.441 | (0.029) | cohd_1948 | 0.510 | (0.036) | yrd16 | -0.052 | (0.012 |
| aged_35 | 1.405 | (0.029) | cohd_1949 | 0.487 | (0.036) | yrd17 | -0.012 | (0.012 |
| aged_36 | 1.466 | (0.029) | cohd_1950 | 0.530 | (0.036) | yrd18 | 0.010 | (0.012) |
| aged_37 | 1.512 | (0.030) | cohd_1951 | 0.524 | (0.036) | yrd19 | 0.077 | (0.012) |
| aged_38 | 1.516 | (0.030) | cohd_1952 | 0.514 | (0.036) | yrd20 | 0.127 | (0.011) |
| aged_39 | 1.539 | (0.030) | cohd_1953 | 0.532 | (0.037) | yrd21 | 0.194 | (0.011) |
| aged_40 | 1.489 | (0.030) | cohd_1954 | 0.543 | (0.037) | | | |
| aged_41 | 1.547 | (0.030) | cohd_1955 | 0.554 | (0.037) | | | |
| aged_42 | 1.568 | (0.030) | cohd_1956 | 0.564 | (0.037) | | | |
| aged_43 | 1.573 | (0.031) | cohd_1957 | 0.560 | (0.037) | | | |
| aged_44 | 1.588 | (0.031) | cohd_1958 | 0.543 | (0.037) | | | |
| aged_45 | 1.512 | (0.031) | cohd_1959 | 0.532 | (0.037) | | | |
| aged_46 | 1.564 | (0.031) | cohd_1960 | 0.554 | (0.038) | | | |
| aged_47 | 1.602 | (0.031) | cohd_1961 | 0.555 | (0.038) | | | |
| aged_48 | 1.582 | (0.031) | cohd_1962 | 0.549 | (0.038) | | | |
| aged_49 | 1.574 | (0.032) | cohd_1963 | 0.577 | (0.038) | | | |
| aged_50 | 1.540 | (0.032) | cohd_1964 | 0.586 | (0.038) | | | |
| aged_51 | 1.562 | (0.032) | cohd_1965 | 0.574 | (0.038) | | | |
| aged_52 | 1.548 | (0.032) | cohd_1966 | 0.526 | (0.039) | | | |
| aged_53 | 1.536 | (0.032) | cohd_1967 | 0.554 | (0.039) | | | |
| aged_54 | 1.506 | (0.032) | cohd_1968 | 0.524 | (0.040) | | | |
| aged_55 | 1.462 | (0.033) | cohd_1969 | 0.521 | (0.040) | | | |
| aged_56 | 1.480 | (0.033) | cohd_1970 | 0.468 | (0.040) | | | |
| aged_57 | 1.501 | (0.033) | cohd_1971 | 0.418 | (0.041) | | | |
| aged_58 | 1.467 | (0.033) | cohd_1972 | 0.450 | (0.042) | | | |
| aged_59 | 1.417 | (0.033) | cohd_1973 | 0.397 | (0.042) | | | |
| aged_60 | 1.408 | (0.033) | cohd_1974 | 0.404 | (0.043) | | | |
| aged_61 | 1.369 | (0.034) | cohd_1975 | 0.374 | (0.044) | | | |
| aged_62 | 1.338 | (0.034) | cohd_1976 | 0.355 | (0.045) | | | |
| aged_63 | 1.361 | (0.034) | cohd_1977 | 0.395 | (0.046) | | | |
| aged_64 | 1.309 | (0.035) | cohd_1978 | 0.385 | (0.048) | | | |
| | | | cohd_1979 | 0.355 | (0.050) | | | |

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

Table 6: Average real earning of men by education (2004 rials per week)

| | Less than upper secondary | Upper secondary | Teriary |
|---|---|---|---|
| 1984 | 363616 | 495167 | 811147 |
| 1985 | 359954 | 501124 | 694770 |
| 1986 | 316415 | 444256 | 702472 |
| 1987 | 270810 | 370966 | 595541 |
| 1988 | 255459 | 310993 | 497010 |
| 1989 | 234703 | 270310 | 391065 |
| 1990 | 245576 | 336641 | 476304 |
| 1991 | 302184 | 378649 | 555336 |
| 1992 | 313659 | 415413 | 626695 |
| 1993 | 286818 | 395746 | 539807 |
| 1994 | 283688 | 398645 | 470954 |
| 1995 | 251105 | 343958 | 434637 |
| 1996 | 266684 | 364696 | 596900 |
| 1997 | 272262 | 400110 | 698827 |
| 1998 | 282008 | 415512 | 652748 |
| 1999 | 281519 | 404151 | 464268 |
| 2000 | 284538 | 448254 | 765234 |
| 2001 | 286092 | 400146 | 687400 |
| 2002 | 302471 | 481898 | 703117 |
| 2003 | 325710 | 439500 | 707775 |
| 2004 | 344397 | 473614 | 809832 |

Source: Authors's calculations, HEIS data files

Table 7: Proportion of men and women with reported earnings, by cohort and age

| Age | 1939-43 | 1944-48 | 1949-53 | 1954-58 | 1959-63 | 1964-68 | 1969-72 | 1974-78 |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| 20-24 | | | | | 0.671 | 0.589 | 0.663 | 0.661 |
| 25-29 | | | | 0.912 | 0.862 | 0.888 | 0.880 | 0.853 |
| 30-34 | | | 0.957 | 0.951 | 0.961 | 0.956 | 0.950 | 0.958 |
| 35-39 | | 0.965 | 0.962 | 0.972 | 0.967 | 0.961 | 0.966 | |
| 40-44 | 0.959 | 0.968 | 0.967 | 0.966 | 0.961 | 0.944 | | |
| 45-49 | 0.952 | 0.957 | 0.950 | 0.951 | 0.968 | | | |
| 50-54 | 0.921 | 0.901 | 0.878 | 0.848 | | | | |
| 55-59 | 0.846 | 0.802 | 0.800 | | | | | |
| 60-64 | 0.703 | 0.709 | | | | | | |
| | | | | | | | | |
| Women | | | | | | | | |
| 20-24 | | | | | 0.083 | 0.092 | 0.167 | 0.159 |
| 25-29 | | | | 0.132 | 0.121 | 0.180 | 0.204 | 0.187 |
| 30-34 | | | 0.125 | 0.139 | 0.192 | 0.201 | 0.202 | 0.183 |
| 35-39 | | 0.087 | 0.130 | 0.208 | 0.202 | 0.196 | 0.171 | |
| 40-44 | 0.084 | 0.124 | 0.199 | 0.213 | 0.197 | 0.209 | | |
| 45-49 | 0.089 | 0.177 | 0.190 | 0.183 | 0.196 | | | |
| 50-54 | 0.138 | 0.160 | 0.161 | 0.153 | | | | |
| 55-59 | 0.137 | 0.130 | 0.124 | | | | | |
| 60-64 | 0.097 | 0.116 | | | | | | |

Source: Authors's calculations, HEIS data files