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## Household Savings and Income Distribution in Mexico

By

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## 1. Introduction

Following the 1994 financial crisis the rate of saving of the Mexican economy fell from 21.7% to 19.8% of GDP.<sup>1</sup> The decline was associated with a reduction in the rate of external saving from 6.9% to 0.5% between 1994 and 1995. The overall reduction was not more dramatic because it was almost fully compensated by an increase in private saving from 11.3% to 15% of GDP during these years<sup>2</sup>.

Since the drop in 1995, total saving rates increased to 23.3% and 26.4% of GDP in 1996 and 1997, respectively. Most of the shift was driven by a raise in domestic saving from 19.3 in 1995, to 24.6 in 1997. A split of domestic saving into its private and public component is not yet available, but if they continued their 1994-1995 trend, the change would have been mostly due to a raise in private saving. During 1994 and 1995, GDP per capita declined in real terms by 8.2%, and by around 1% during the whole 1994-1997 period.<sup>3</sup> While not inconsistent with the evidence from other countries, such as the US, an increase in the domestic component of saving might seem surprising. In the aftermath of a strong negative economic shock one would rather expect that at least the private sector would try to smooth out the shock precisely by reducing saving rates to maintain consumption and investment levels.<sup>4</sup>

How could domestic savings rates increase so much during the recession years? Unfortunately, the Mexican system of National Accounts does not break down private saving into its household and corporate components. Therefore, it is not possible to know what has been the role played by individuals or firms in the determination of aggregate saving. Moreover, the aggregate data do not provide much information on whether the changes in private saving are just a short-term response to the economic shock, or if they

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<sup>1</sup> INEGI, 1998.

<sup>2</sup> Banco de México (1996, pg. 17). Public saving rates also increased, although less, from 3.5% to 4.3% of GDP. These numbers should be taken with caution, since the domestic saving rate is obtained as a residual from the total and external saving rates.

<sup>3</sup> GDP per capita increased by 2.89% and 5.25% in real terms in 1996 and 1997, respectively, according to calculations from BM (1998).

are related to longer-term shifts in behavior. Aggregate household saving could move in the short run for a variety of reasons. Without a disaggregated analysis of household behavior and without identifying the structural reasons for changes in household saving, it is not possible to interpret movements in aggregate saving rates and/or provide useful policy prescriptions.

The objective of this paper is to take a close look at household saving behavior in Mexico in the 1980s and 1990s. More specifically, we want to verify whether the change in domestic saving observed in the aggregate can be attributed to households rather than the corporate sector, and if so, if the change in household saving behavior is related to short or longer term decisions. More generally, we would like to characterize household saving behavior in several dimensions. These include controlling for cohort effects, for changes in family structure and demographic trends and, above all, for changes in the distribution of income. Our analysis has, obviously, important policy implications. It can provide a clearer picture on the perspectives of savings in Mexico, and can be used to assess the desirability and effectiveness of policies designed to stimulate private savings in the country.

We start our analysis by showing some evidence on the level of aggregate household saving and its changes through time. Partly because of the unavailability of National Account data on household saving, and partly because of the difficulties in working with household survey data, there is very little evidence on the evolution of household saving.<sup>5</sup>

To describe the large amount of data included in the household surveys we need a unifying framework. We present the data within the context of the life cycle model. Even if individual households do not necessarily act according to the model, it is interesting to present the evolution of saving behavior as groups of households that go through different stages of their life cycle. On the basis of that framework, we then try to

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<sup>4</sup> For instance, unemployment rates increased to historical levels during the 1994-1996 period, and these types of changes are normally associated to household and corporate dissaving.

characterize the response of saving to different shocks. In this respect the cross sectional dimension and the fact that different groups of households (such as for instance those headed by individuals with different degrees of educational attainment) experience different shocks is crucial. This type of exercise can be useful in interpreting the aggregate evidence of an increase in saving rates during a downturn.

The links between income distribution and saving behavior are many. Within a permanent income model, individuals with high current income are likely to save more as they smooth out the temporary components of income. An additional dimension can arise if large sectors of the population are close to subsistence levels, so that they are unable to accumulate a buffer stock of precautionary saving or to accumulate for retirement. On the other hand richer individuals might have additional motives for saving, such as the accumulation of resources to be bequeathed. In such a situation, any change in household saving in the country will be determined mainly by the saving decisions of few rich individuals, and, if the majority is not able to make provisions for retirement, there could be strong pressures over public resources in the future.

The issue of retirement saving is particularly important in Mexico because the country just went through the process of privatizing its social security system. Although the country is still relatively young, its population is starting to age.<sup>6</sup> Indeed, the reform of the pension system was partly designed in response to these demographic trends. However, an issue as yet unresolved is the size of the sectors of the Mexican society that are effectively excluded from the private pension system as they are unable to save, or do not have access to private pensions.

As mentioned above, if the capacity to save is highly concentrated, only few individuals will be able to use past savings as a buffer stock. Those who do not have access to a buffer stock will most likely worsen their position in the income distribution, and can

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<sup>5</sup> To our knowledge, there are only three works that have attempted to measure household saving in Mexico by using household survey data. These are Luch, et.al. (1977), Villagómez and Zamudio, 1997, and Székely 1988, but none of them extend to more than 1994.

<sup>6</sup> See Duryea and Székely (1998).

generate strong demand for wider safety nets. Moreover, in these circumstances, a shock can have long term implications because saving is also a way of accumulating income-earning assets. So, differences in the capacity to save or smooth out a shock today can be informative about the capacity to generate income in the future and therefore about the perspectives for inequality and social mobility.

Mexico is the only country in Latin America where five broadly comparable national household surveys containing information on income and expenditure exists. These surveys were held in 1984, 1989, 1992, 1994 and 1996. The timing of the surveys is adequate, since they comprise two periods of economic stagnation (1984 to 1989, and 1994-1996), the first stages of the reform to the pension system, and periods of intensive distributional changes.

The rest of this paper is organized as follows. Section 2 assesses the level of household saving in Mexico, its changes through time, and takes a look at which types of households save in the country. Section 3 heavily relies on cohort analysis to estimate the life cycle patterns of saving behaviour. This analysis could help to establish whether simple versions of the life-cycle theory help us understand the differences in saving behavior *across* cohorts, and their changes over time. In particular, we are interested in identifying long term changes in saving behavior among Mexican households. In section 4, rather than looking at differences between cohorts, we take a look at the variance *within* cohorts. We characterize the life cycle pattern of within group variances of consumption and income, and then identify the changes in the variances of the transitory and permanent components of income. This is informative about the nature of the shocks that affected Mexican households during the period covered by the surveys. Section 5 concludes.

## 2. Who saves in Mexico, and how much?

Even though 5 household surveys with the necessary information for quantifying saving rates among households in the country are available, there are very few studies that have attempted its measurement. To our knowledge, the only ones are Villagómez and Zamudio (1997) and Székely (1998). Calderón (1996) has provided some estimates of corporate and household savings separately for the country, but his results are not comparable with those obtained from household surveys because he only accounts for the savings that are actually registered as financial flows in the formal financial system and some that are reported in the National Accounts.<sup>7</sup>

In this paper, we use extensively the 5 surveys available. As mentioned above, the surveys were held in 1984, 1989, 1992, 1994 and 1996. These nationally representative surveys are collected with a broadly comparable methodology and are held during the same days of each year. The number of observations is 4,595, 10,531, 11,920, 12,815 and 14,042, respectively.<sup>8</sup>

For the purpose of this work, we have used the surveys to estimate household saving under two definitions. First we simply compute the difference between total household disposable income (including imputed rents from owner occupied housing, income in kind, gifts and auto consumption), and total expenditures (which include monetary and non-monetary items). This measure is labeled  $S_1$ . Secondly, we use an alternative definition of consumption where we include only expenditures on non-durable goods (named  $S_2$ ).<sup>9</sup> It should be stressed that the Mexican household surveys only contain

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<sup>7</sup> Specifically, Calderon computes household saving by adding the net accumulation of financial assets in the banking system, plus the investment in housing and construction reported in the National Accounts. As noted by Besley (1995), a very considerable proportion of household saving never reaches the formal financial system and therefore is not captured by National Account aggregates or banking system balances.

<sup>8</sup> Székely (1998a) provides a detailed description of the 1984-1992 surveys. A description of the 1994 survey can be found in Duryea and Székely (1998).

<sup>9</sup> Non durable consumption is computed by subtracting from total consumption, mortgage payments, expenditure in furniture and household appliances, orthopedic and therapeutic items, vehicles and leisure. No adjustments were performed to the data, so total income and consumption do not coincide exactly with the aggregates in the National Accounts. See Székely (1998a) for a more detailed discussion of these differences.



information on disposable income. Our measures of saving do not include “forced” saving through pensions or social security payments.

## 2.1. Aggregate household saving.

Table 1 presents some summary statistics. In particular, for each of the two definitions and each of the years we compute the ratio of average saving over average income, the average of individual saving rates and the median saving rate. According to our estimates, the level of household savings in Mexico is relatively high by international standards. During the 1984-1996 period, saving rates range from 8.5% to 14.1% of total household disposable income in the case of  $S_1$ , and from 12.4% to 17.5% for  $S_2$ . In both cases, saving rates increase continuously between 1984 and 1994. They peak in 1994, and decline between 3.8 and 4.6 percentage points between 1994 and 1996. The drop between 1994 and 1996 is quite dramatic, as household savings almost go back to their 1984 levels.<sup>10</sup>

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<sup>10</sup> The estimates for 1984, 1989 and 1992 do not coincide exactly with the estimates of  $S_1$  and  $S_2$  reported in Székely (1998). The difference is that Székely also measures saving as the difference between disposable income and non-durable consumption, but he adjusts consumption to include interest payments from debt. We have not done the same adjustment here, and therefore, the saving rates are 2.6, 1.8 and 2.3 percentage points higher for  $S_1$ , and 2.4, 1.7 and 2.6 point greater in the case of  $S_2$ , than those reported in Table 1 in Székely (1998).

**Table 1**  
**Household Saving Rates in Mexico**

	Year	S1			S2		
		<i>Rate</i>	<i>Average</i>	<i>Median</i>	<i>Rate</i>	<i>Average</i>	<i>Median</i>
Levels	1984	8.5	-3.2	6.4	12.4	-0.7	7.8
	1989	11.1	-5.3	7.0	15.4	-1.8	9.5
	1992	12.0	-1.1	4.5	16.3	2.1	6.9
	1994	14.1	3.4	7.3	17.5	5.8	9.1
	1996	9.5	-2.6	2.2	13.7	0.2	3.9
Change (points)	1984-89	2.6	-2.1	0.6	2.9	-1.2	1.7
	1989-92	0.9	4.2	-2.6	0.9	3.9	-2.7
	1992-94	2.1	4.5	2.9	1.2	3.6	2.3
	1994-96	-4.6	-6.0	-5.1	-3.8	-5.6	-5.2
	1984-96	1.0	0.6	-4.2	1.3	0.9	-3.9

Source: Author's calculations from the Income and expenditure surveys, 1984, 1989, 1992, 1994, 1996.

In the whole 12-year period, the saving rate increased by 1 and 1.3 percentage points, respectively. It is interesting to note that the changes in household saving in Mexico for the two definitions are very similar, with the exception of 1992-1994. In this sub period, S<sub>1</sub> increased more than S<sub>2</sub>, which implies that the consumption of durable goods increased by less than total consumption. This result is quite surprising, since the 1989-1994 years are normally thought of as periods of economic recovery and consumption booms. With regards to 1994-1996, the fact that S<sub>1</sub> declined by more than S<sub>2</sub> suggests that the consumption of non-durable goods fell by more than total consumption.<sup>11</sup>

Since the National Accounts for Mexico do not allow to separate private saving into its household and corporate components, strictly speaking it is not possible to compare these results with the national aggregate saving figures.<sup>12</sup> To obtain a gross approximation of

<sup>11</sup> One possible reason is that during 1989-1994 Mexico went through a credit boom in which many households acquired debt. If they continued to pay at least part of their debt after 1994 and the credit was used to purchase durable goods, the surveys would register the payments as expenditures in durables. The results in Table 1 are interesting because Villagómez and Zamudio (1997) and Calderón (1996) have argued that household saving during 1989-1994 declined. Villagómez and Zamudio use the same data to obtain their estimates, so the difference could be lying in the definition of either disposable income or the goods classified as non-durable. The trends in table 1 are, however, compatible with the ones reported in Székely (1998).

<sup>12</sup> One attempt to do this is Székely (1998). An additional problem with the comparisons in Table A1 is that both, the National Accounts and household surveys are normally affected by measurement error. It is

the role played by household saving in the evolution of total saving, table A1 in the appendix compares the trend in  $S_1$  and  $S_2$  computed from the household surveys with the trends in National Accounts aggregates. According to the macro aggregates, private domestic saving as a proportion of GDP increased between 1984 and 1989 and between 1992 and 1994. Our results suggest that at least part of the raise was originated in the household sector. Between 1989 and 1992 aggregate domestic private saving declined from 18.1% to 10.2% of GDP, and since household saving show a slight increase in this period, the decline must have been due to a reduction in saving in the corporate sector. For 1994-96 we only have information on the evolution of total domestic saving, which increased by around 9 percentage points.  $S_1$  and  $S_2$  decline sharply in these years, so the increase must have been originated either in the public or the corporate sector.

Table 1 also includes the average and median saving rate of Mexican households. Notice that the average is often negative, reflecting the presence of households with very negative saving. This finding is in line with the evidence from other countries<sup>13</sup>. For both definitions, average household saving declined between 1984 and 1989 (the average rates became more negative), rise up to 1994, and fall dramatically between 1994 and 1996. The median saving rates increase between 1984 and 1989, decline in 1989-92, rise again toward 1994 and drop toward 1996. It is interesting to note that for all years and for both definitions, the saving rate is higher than the median, which suggests that household saving in Mexico is highly concentrated among the richest households.

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normally thought that the surveys are more prone to this problem since one of the main sources of measurement error is that individuals may under report their incomes or expenditures. If the degree of income under reporting changes from one survey to another and it differs from the degree of consumption under reporting, the estimated household saving rates can vary for purely statistical reasons. It is normally thought that consumption is less subject to this type of measurement error and that incomes at the lower and upper tail of the distribution are more prone to under reporting. This implies that the saving rates reported in Table 1 may underestimate the real level of saving in Mexico, but it is difficult to assess the implications for the changes through time. Lustig and Székely (1998) have adjusted the data in the first four household surveys to try to make it compatible with some aggregates in the national accounts. By using private consumption (which includes the consumption of firms and individuals), wages (which in the national account include taxes), etc., as reference, they find that the differences between the survey data and the national accounts differs substantially from year to year. For instance, in the case of wage incomes (which are usually subject to less measurement error than other incomes), the National Accounts register a 15.2% decline between 1984 and 1989, while in the surveys wages increase by 25%. Similarly, private consumption per capita declines by 6.5% during the same years in the national aggregates, but in the surveys it increases by 21.4%.

<sup>13</sup> See for instance Sebelhaus (1998), who documents this for the US.

<b>Table 2</b>					
<b>Household Saving in Various Percentiles of the Distribution</b>					
<i>Percentile</i>	<i>Saving Rate (% of household per capita income)</i>				
	1984	1989	1992	1994	1996
<b>Definition S1</b>					
1st	-176.7	-215.9	-140.0	-120.4	-135.9
5th	-67.8	-79.1	-60.6	-47.5	-55.2
10th	-38.0	-49.1	-40.3	-29.5	-34.2
25th	-12.9	-14.9	-13.0	-8.6	-12.7
75th	22.5	25.6	21.7	22.8	17.2
90th	39.2	41.9	36.4	38.4	32.0
95th	48.2	52.5	46.1	47.4	41.8
99th	64.1	70.5	65.4	64.6	60.4
<b>Definition S2</b>					
1st	-153.9	-212.3	-132.9	-113.3	-126.5
5th	-58.1	-73.9	-54.5	-43.9	-52.6
10th	-33.4	-43.1	-33.0	-26.9	-31.5
25th	-10.6	-12.0	-9.7	-6.4	-10.9
75th	24.4	27.6	23.8	25.0	19.5
90th	40.7	44.9	39.1	40.1	35.4
95th	50.1	54.7	48.0	49.4	45.7
99th	66.5	72.4	66.1	65.9	67.0
Source: Authors' calculations from the Income and expenditure surveys by INEGI, 1984, 1989, 1992, 1994 and 1996.					

Table 2 takes a closer look at saving rates along the income distribution. As can be seen, the rates are highly negative up to the 25<sup>th</sup> percentile. In contrast, saving among households in the 75<sup>th</sup> percentile are positive and quite high, and the rates for the 99<sup>th</sup> percentile reach more than 64% for both definitions and for all years. One interesting aspect is that, according to S<sub>1</sub> household saving became less concentrated among the richest households between the 1994-1996 crisis years. On the other hand, according to S<sub>2</sub>, saving became even more concentrated among the rich during the same period (note that the difference between the poorest and richest ones expanded under the second definition).

## 2.2. What types of households save?

The negative value of the average saving rates in Table 1 for some years and the results in table 2, show that there are very large differences in saving across Mexican households. If low or negative saving rates were only a temporary phenomenon; they

would not necessarily be of concern because they could simply reflect that some households are responding to a change in the economic environment perhaps by using past savings. However, if these low rates reveal a more permanent incapacity of some households to accumulate resources for facing unexpected income shocks or for retirement, they could be more worrisome.

One way to look into this issue is to check whether savings are concentrated in some groups of the population. Székely (1998) for instance, shows that more than 70% of total household savings in Mexico were concentrated among the richest 10% of the income distribution in 1984, 1989 and 1992, while the poorest 40% accounts for a negative proportion of the total.

In this paper, unlike Székely (1998), instead of looking at the distribution of saving by current income deciles, we analyze the saving behaviour of different education groups. This has two (related) advantages. First, education can be thought of as a proxy to permanent income. Thus, if households with low levels of education save on average very little (or even negative amounts), this could be the consequence of relative flat earning profiles or could reflect a permanent incapacity to accumulate resources. Second, few household heads change their education level after they become heads. Although the Mexican surveys do not follow the same individual through time, splitting the sample into education groups allows us to follow the same groups over time. If transitory components of income are important and more generally in the presence of income mobility, changes in saving by income deciles confound genuine changes in saving behaviour with composition effects.

<b>Table 3</b>									
<b>Distribution of household saving in Mexico by education level</b>									
<i>Education level</i>	<i>Proportion of Total Saving</i>					<i>Change</i>			
	1984	1989	1992	1994	1996	1984-89	1989-92	1992-94	1994-96
<b>Definition S1</b>									
No schooling	2.4	2.8	4.0	1.3	6.4	0.4	1.2	-2.8	5.1
Primary incomplete	8.5	11.1	8.6	7.4	6.4	2.7	-2.5	-1.2	-1.0
Primary complete	11.2	11.8	10.6	10.3	8.9	0.6	-1.2	-0.4	-1.4
Secondary incomplete*	13.5	16.5	11.1	15.0	8.9	3.0	-5.4	3.9	-6.1
Secondary complete*	31.9	21.7	17.2	18.3	13.8	-10.2	-4.5	1.1	-4.5
Higher education	32.6	36.1	48.4	47.8	55.7	3.5	12.3	-0.7	8.0
Total	100	100	100	100	100				
<b>Definition S2</b>									
No schooling	2.9	6.5	4.1	3.5	5.9	3.6	-2.3	-0.6	2.4
Primary incomplete	10.6	10.9	9.3	7.1	8.6	0.3	-1.6	-2.2	1.5
Primary complete	12.4	11.1	9.4	11.0	9.3	-1.2	-1.7	1.5	-1.7
Secondary incomplete*	13.4	16.4	11.5	14.4	10.0	3.1	-5.0	2.9	-4.4
Secondary complete*	27.4	19.0	17.2	17.1	13.6	-8.4	-1.8	-0.1	-3.5
Higher education	33.4	36.2	48.5	46.9	52.6	2.8	12.3	-1.6	5.7
Total	100	100	100	100	100				
Source: Author's calculations from the income and expenditure surveys. Household heads are used as the reference.									
*Secondary education includes the 6 years of post-primary education.									

Table 3 shows that most of the household savings in Mexico are generated in households whose head had either higher education or a completed secondary degree. Since these kinds of households are at the top of the income distribution, it would be safe to say that the richest households generate most savings. Table A2 in the appendix shows the proportion of household heads in each education category and provides more information on the magnitude of the concentration. According to these figures, for instance, in 1994, 3.4% of the household heads had some higher education. Table 3 reveals that they concentrated between 47.8% and 46.9% of total savings. At the other extreme, in 1994, 19.5% of the household heads had no education, and accounted for only between 1.3% and 3.5% of total savings.

As better-educated individuals are typically richer than individuals with little education, it is not surprising that they account for a larger proportion of total saving. However, saving is more unequally distributed than income. Table 4 reports the distribution of income by education group. For both of our definitions, savings appear to be more concentrated than income. This is an indication that better educated individuals not only save more, but they save, on average, a higher proportion of their current disposable income. This places

them in a much more favorable situation to smooth out negative shocks or to finance consumption when their incomes decline due to business cycle fluctuations.

The degree of concentration of savings has increased dramatically. By 1984, households whose heads had higher education, concentrated between 32.6% and 33.4% of total saving, while by 1996 they accounted for around 55.7% and 52.6% of the total (Table 3). These increases in the concentration of income were not reflected in similar increases in income inequality. Better-educated households continued to account for a similar proportion of total flow of income as in 1984 (see Table 4). Interestingly, most of the concentration of saving was observed during the 1989-1992 and the 1994-96 periods, where income distribution deteriorated only slightly.<sup>14</sup>

<b>Table 4</b>									
<b>Distribution of Income by Education Groups</b>									
<i>Education level</i>	<i>Proportion of Total Income</i>					<i>Change</i>			
	1984	1989	1992	1994	1996	1984-89	1989-92	1992-94	1994-96
No schooling	2.3	6.0	4.2	6.5	7.6	3.7	-1.8	2.3	1.2
Primary incomplete	11.2	11.7	10.1	10.0	9.4	0.5	-1.7	-0.1	-0.6
Primary complete	17.5	14.4	15.2	15.3	15.0	-3.1	0.8	0.1	-0.3
Secondary incomplete*	18.1	17.4	17.4	16.5	17.1	-0.7	0.0	-0.9	0.5
Secondary complete*	21.7	20.1	18.6	16.9	17.3	-1.6	-1.6	-1.7	0.4
Higher education	29.3	30.4	34.5	34.8	33.6	1.1	4.2	0.3	-1.2
Total	100	100	100	100	100				
Source: Author's calculations from the income and expenditure surveys.									
*Secondary education includes the 6 years of post-primary education.									

Table 5 shows the saving rate of each education group. While households whose head has higher education save 20.6% of their disposable income under definition  $S_2$ , those whose head have incomplete primary or no education save less than 7%. The difference in the saving rate between the uneducated and those with high education is larger for  $S_2$  than for  $S_1$  for 1996 (and other years). This means that the rich save more than the poor through the purchase of durable goods.

The saving rates among better-educated households are high by international standards, and can have strong implications for mobility and income distribution in the future. It is not only that rich households are in a better position to smooth out shocks. They also

have better chances of using their resources to bequeath (and therefore reproduce the inequality in the distribution of the stock of resources), or to accumulate more income-earning assets that can further improve their position in the distribution. Those who receive the lowest income flows today save much less and have scarcer possibilities of investing in the acquisition of assets that could increase their income in the future.

<b>Table 5</b>									
<b>Household Saving Rates by Education Groups*</b>									
<i>Education level</i>	<i>Saving Rates</i>					<i>Change</i>			
	1984	1989	1992	1994	1996	1984-89	1989-92	1992-94	1994-96
<b>Definition S1</b>									
No schooling	4.0	5.2	6.7	2.8	4.0	1.2	1.6	-4.0	1.2
Primary incomplete	5.4	8.6	6.9	9.5	4.9	3.2	-1.7	2.6	-4.6
Primary complete	9.1	10.5	11.5	10.4	6.4	1.5	1.0	-1.1	-4.0
Secondary incomplete*	9.4	11.2	11.8	12.6	7.6	1.7	0.7	0.7	-5.0
Secondary complete*	10.2	11.9	13.2	15.6	11.1	1.7	1.3	2.4	-4.6
Higher education	12.5	13.2	16.8	19.4	15.8	0.7	3.6	2.6	-3.6
Total population (S1)	8.5	11.1	12.0	14.1	9.5				
<b>Definition S2</b>									
No schooling	8.8	11.8	9.4	9.0	6.5	3.1	-2.5	-0.3	-2.5
Primary incomplete	9.2	14.2	9.5	10.4	7.0	5.0	-4.6	0.8	-3.3
Primary complete	11.6	14.4	13.2	12.1	7.1	2.8	-1.2	-1.1	-5.1
Secondary incomplete*	11.7	14.5	15.1	13.9	10.1	2.7	0.6	-1.1	-3.8
Secondary complete*	15.9	16.5	15.5	17.3	15.8	0.6	-0.9	1.8	-1.5
Higher education	19.1	18.3	22.2	22.9	20.6	-0.8	3.9	0.7	-2.2
Total population (S2)	12.4	15.4	16.3	17.5	13.7				
Source: Author's calculations from the income and expenditure surveys. Household heads are used as the reference.									
*Secondary education includes the 6 years of post-primary education.									

In tables 5a and 5b we present the average and median saving rates by education. The results for the average  $S_2$  are striking. While during 1984-1992 and 1996 a household whose head had no education registered highly negative average saving rates, the average saving of those whose head had higher education reached between 5.1% and 11.6% in the first three years, and 7.5% in 1996. Therefore, poorly educated households are dis-saving, on average, at high rates. This is a consequence of a sizeable minority of households with very large negative saving rates. These might reflect a high variance of transitory shocks among these households. The fact that they have relatively low stocks of savings (maybe

<sup>14</sup> Some evidence on this is presented in section 4.



because of relatively flat earning profiles) could explain the relevance of large negative saving rates. The extremely low median saving rates among these households, particularly in 1996, confirms this.

<b>Table 5a</b>									
<b>Average Saving Rates by Education Groups</b>									
<i>Eduaction level</i>	<i>Average Saving Rates</i>					<i>Change</i>			
	1984	1989	1992	1994	1996	1984-89	1989-92	1992-94	1994-96
<b>Definition S1</b>									
No schooling	-1.4	-3.0	-1.6	3.3	-1.8	-1.6	1.4	5.0	-5.1
Primary incomplete	-7.3	-3.1	-4.4	2.9	-3.5	4.3	-1.3	7.3	-6.4
Primary complete	1.4	-17.8	-3.8	2.9	-6.1	-19.2	14.0	6.7	-9.0
Secondary incomplete*	-1.2	-2.7	0.6	3.4	-4.9	-1.5	3.3	2.9	-8.3
Secondary complete*	-2.5	-0.3	2.2	-2.4	2.7	2.2	2.5	-4.7	5.2
Higher education	-0.3	-2.3	6.4	8.8	3.1	-2.0	8.7	2.3	-5.7
Total population (S1)	-3.2	-5.3	-1.1	3.4	-2.6				
<b>Definition S2</b>									
No schooling	-0.5	-1.0	-0.1	4.6	-0.2	-0.5	0.9	4.7	-4.8
Primary incomplete	-5.5	-0.9	-1.4	4.5	-1.6	4.5	-0.5	5.9	-6.1
Primary complete	5.0	-12.4	-1.3	4.9	-3.2	-17.4	11.1	6.2	-8.1
Secondary incomplete*	1.7	0.7	4.7	6.2	-1.8	-1.0	4.0	1.5	-8.0
Secondary complete*	2.6	4.4	6.5	3.6	6.8	1.8	2.2	-3.0	3.2
Higher education	7.1	5.1	11.6	12.3	7.5	-2.0	6.5	0.7	-4.8
Total population (S2)	-0.7	-1.8	2.1	5.8	0.2				
Source: Author's calculations from the income and expenditure surveys. Household heads are used as the reference.									
*Secondary education includes the 6 years of post-primary education.									

At the other extreme, there also seems to be large differences in saving rates among the better educated households (see the value of the average and median rates in tables 5a and 5b). For instance, in the case of S<sub>2</sub>, the median in 1996 is 10.3%, so 50% of these households have saving rates above this level.

<b>Table 5b</b>									
<b>Median Saving Rates by Education Groups*</b>									
<i>Education level</i>	<i>Median Saving Rates</i>					<i>Change</i>			
	1984	1989	1992	1994	1996	1984-89	1989-92	1992-94	1994-96
<b>Definition S1</b>									
No schooling	3.6	3.0	1.8	5.8	-0.1	-0.6	-1.2	4.0	-5.9
Primary incomplete	3.8	5.1	2.5	6.8	0.7	1.2	-2.6	4.4	-6.1
Primary complete	3.9	6.7	4.3	6.9	1.5	2.8	-2.4	2.6	-5.4
Secondary incomplete*	6.2	7.5	5.0	6.9	2.4	1.3	-2.5	1.9	-4.5
Secondary complete*	7.0	7.6	5.1	7.6	5.8	0.6	-2.4	2.4	-1.8
Higher education	8.0	8.8	8.9	13.0	7.0	0.8	0.1	4.1	-6.0
Total population (S1)	6.4	7.0	4.5	7.3	2.2				
<b>Definition S2</b>									
No schooling	6.6	7.2	3.4	7.4	1.5	0.7	-3.8	3.9	-5.9
Primary incomplete	6.9	9.0	4.2	8.0	2.6	2.1	-4.8	3.9	-5.4
Primary complete	7.2	9.5	6.7	8.3	2.7	2.3	-2.8	1.6	-5.5
Secondary incomplete*	7.5	9.5	7.4	8.6	3.5	2.0	-2.2	1.2	-5.0
Secondary complete*	8.7	11.4	7.9	11.4	9.9	2.7	-3.5	3.5	-1.5
Higher education	8.9	11.6	14.3	15.6	10.3	2.8	2.7	1.3	-5.3
Total population (S2)	7.8	9.5	6.9	9.1	3.9				
Source: Author's calculations from the income and expenditure surveys. Household heads are used as the reference.									
*Secondary education includes the 6 years of post-primary education.									

Three conclusions emerge from this section. First, aggregate household saving in Mexico are high by international standards. Second, household savings increased substantially between 1984 and 1994, and declined between 1994 and 1996. Third, there are very large differences in saving capacity across households. While those that tend to have higher permanent incomes save a considerable proportion of their income, those that tend to be at the lower tail of the income distribution save much less, and a considerable proportion of them register highly negative savings.

### 3. Characterizing life cycle saving profiles

Saving is an inherently dynamic phenomenon. Therefore, to understand it, it is important to follow individual behaviour over time. In this section, we characterize the life cycle pattern of saving behavior both for the total sample and for different education groups. As we do not follow the same individuals over time, we are forced to use an average cohort approach. This technique, pioneered by Browning, Deaton and Irish (1985),

consists in grouping the households in subsequent surveys according to fixed criteria (such as the year of birth of the household head and/or his educational attainment). One can then follow the average behavior of the variables of interest for these groups rather than for individuals.<sup>15</sup>

Even if the life cycle motive is not the main reason for saving, life cycle profiles and their differences across education groups could be informative about alternative reasons for saving and, more generally, on the dynamics of aggregate saving. Furthermore, by following each year of birth cohort, we control for differences across cohorts.

The analysis of this section is central to the questions we posed in the introduction for two reasons. First, it can throw some light on the reasons why household saving patterns have changed during 1984-96. For instance, the change in saving could simply be the outcome of demographic shifts where the proportion of people concentrated in high-saving ages, increased. Alternatively, younger generations could in general be saving more, and this might have caused the expansion. In this case, the change might be reflecting longer-term changes in behavior that will have long-lasting consequences for saving.

Second, understanding the pattern of life cycle saving and its differences across different and well-defined population subgroups is crucial to evaluate the adequacy of saving for retirement and, therefore, to evaluate different pension systems. Since a reform to the Mexican pension system is currently under way, it is important to know if some groups of society will be unable to save even with the new mechanisms.

The differences in saving rates among education groups documented in the previous section could be explained in several ways. For instance, in a simple life cycle story, if earning-age profiles of less educated individuals were flatter than those of better-educated ones, the latter would save more both in terms of levels than in terms of

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<sup>15</sup> See Deaton (1997) and Attanasio and Banks (1998) for a detailed discussion of this technique. Cohort analysis is used as opposed to simply looking at the age-saving profile of the population because, as explained by Shorrocks (1975), if different generations have different saving behavior, the age-saving profile obtained from only one cross section, will be biased.

proportion of their income. Furthermore, differences in needs (because, for instance, of differences in family sizes over the life cycle) or in the pattern of income (because, for instance, of differences in female labour force participation) could also explain differences in average saving rates. The cohort analysis in Section 3.2 can be informative about these issues.

Before starting our cohort analysis, it is worth stressing that such an approach is not exempt from problems. Cohorts and education groups of households are followed over time under the assumption that the composition of the groups is constant. Such an assumption can be violated for a variety of reasons.

- As discussed, for instance, by Deaton and Paxson (1998), the process of household formation and dissolution can change the composition of cohorts. The analysis takes the household head as reference but if the head changes -for instance due to creation through the marriage of two individuals previously living in the parental unit -, saving will change but the shift can be simply a consequence of having a non-stable sample of household heads. As household formation and dissolution is likely to be endogenous, this could create severe biases, especially at the beginning and at the end of the life cycle.
- Deaton and Paxson (1998) have also stressed another reason why changes in family composition may blur the life-cycle picture. If relatively poorer elderly individuals move in with their children, their behavior will affect the saving patterns of middle aged households and the change in the composition of elderly households will introduce a further bias in the last part of the life cycle.
- A related problem is stressed by Attanasio and Hoynes (1998). Differential mortality rates can also be responsible for changes in the composition of household heads. If longevity and wealth are positively correlated, as cohorts age, poorer individuals will on average die before richer ones, and the cohort will become progressively 'richer'. If mortality rates among the poor are sufficiently high and if rich households save more because, for instance, of bequest motive, a hump-shaped savings pattern might

not be observed, because the reduction in savings in old age could be totally offset by the change in the composition of the sample.

These problems introduce possible biases in the age profiles of the variables of interest and will be further discussed in what follows. In addition, there might be problems that are specific to the Mexican survey. In particular, even though the five surveys are mostly comparable, they have different sample sizes. This means that the degree of precision of average values will be different in different years. As noted in Section 2, the earliest Mexican survey was carried out on a smaller sample of around 4,500 observations, while the latest one was held with more than 14,000. And even if the sample size was the same, there is always some degree of measurement error in any survey. Additionally, not all the cells plotted in the Figures below are of the same size. In fact, since the Mexican population is relatively young, some of the smallest cells in terms of sample size are those for the cohorts observed at older ages. Therefore, the degree of precision of the estimated averages for these cohorts might be low.

### 3.1. Life cycle profiles for the whole sample

In what follows, we form year of birth cohorts using 5-year intervals. For instance the households whose head was born between 1965 and 1969 form cohort 1, those whose head was born between 1964 and 1960 form cohort 2 and so on.

We start our analysis of age profiles by looking at average family size.<sup>16</sup> In Figure 1a, we plot average family size against age for the cohorts in our sample. As we will use this type of graph extensively, it is worth spending a few words to explain how it is constructed and interpreted. Each connecting segment represents the average family size of a given cohort as it is observed in different surveys. For instance, the youngest cohort was observed at an average age of 20 in 1984, 25 in 1989 and so on. Cohort 2 was on

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<sup>16</sup> In this and the following sections, the average are computed using un-weighted data. The expansion factors the surveys provide are representative for the population at large. When we consider averages for particular groups, such as cohorts or education groups, such weights are no longer representative. It should be stressed however, that if we use the expansion factors that the surveys provide, all the graphs look very similar, and none of our conclusions change. The results using weighted data are available from the authors upon request.

average 24 in 1984, and 29 in 1989. This means that each cohort is observed over a different interval of its life cycle. However, as the survey covers a period of 13 years and cohorts are defined by a 5-year interval, the profile of each cohort overlaps with those of adjacent cohorts. That is, adjacent cohorts are observed at similar ages albeit at different points in time.

It is tempting and, in the case of family size probably justifiable, to interpret the vertical difference between the profiles of different cohorts observed at the same age as reflecting cohort effects. It should be remembered, however, that these differences might also reflect pure time effects. In general, observed cohort averages are affected by cohort, time and age effects. Because of the perfect collinearity among these three variables, it is impossible to disentangle these effects without additional information or a-priori information. Any cohort effect could always be reproduced as a combination of age and time effects.

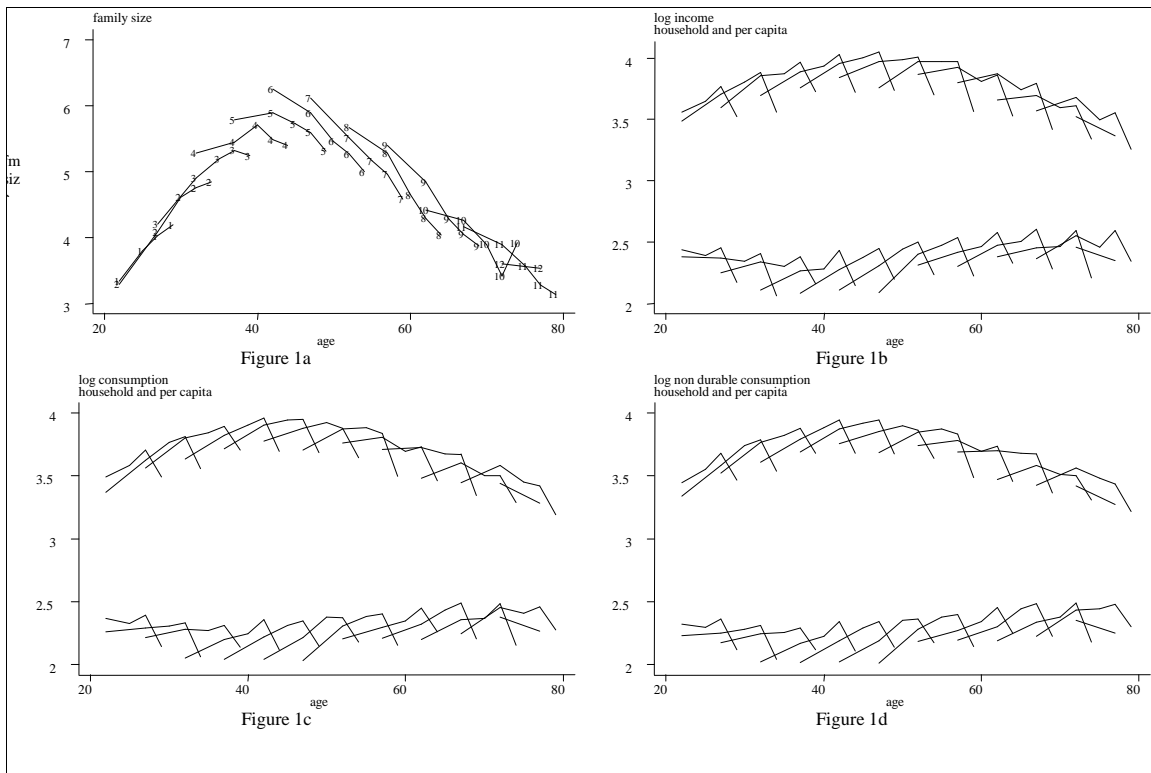
In the case of family size, however, it is difficult to imagine systematic and important ‘time’ effects. Therefore, the substantial differences among cohorts in Figure 1a are legitimately interpreted as negative cohort effects: younger cohorts are characterized by much smaller families. In addition to the substantial cohort effects, Figure 1a shows that average family size follows a ‘hump shaped’ profile, peaking around age 45.

In Figure 1b we plot the cohort averages for log total household income and log income per capita. Even though, as mentioned above, it is formally impossible to distinguish age, time and cohort effects, some patterns are quite evident. As with family size, even this variable follows a hump shaped profile: income increases by about 50% between the beginning of the life cycle and its peak that occurs around age 45-50. In addition to some cohort effects, some sizeable time effect, like the substantial drop in 1996 are visible both in the total and per capita figures.<sup>17</sup> Notice that the per capita income profile is, not surprisingly, much flatter than that for total household income.

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<sup>17</sup> It must be kept in mind that if there is a different degree of under reporting in different years, changes in income and expenditure could be underestimated or exaggerated. Since average incomes in the survey increase by much more than average GDP per capita up to 1994 (and specially between 1984 and 1989),

**Figure 1**  
**Family size, income and consumption profiles for the whole population**



In figures 1c and 1d, we plot the life cycle profiles for the log of total and non-durable consumption. In each figure we report both the household and the per capita figures. As for income, we notice that the profiles for both variables measured at the household level are hump shaped. Those in per capita terms are much flatter.

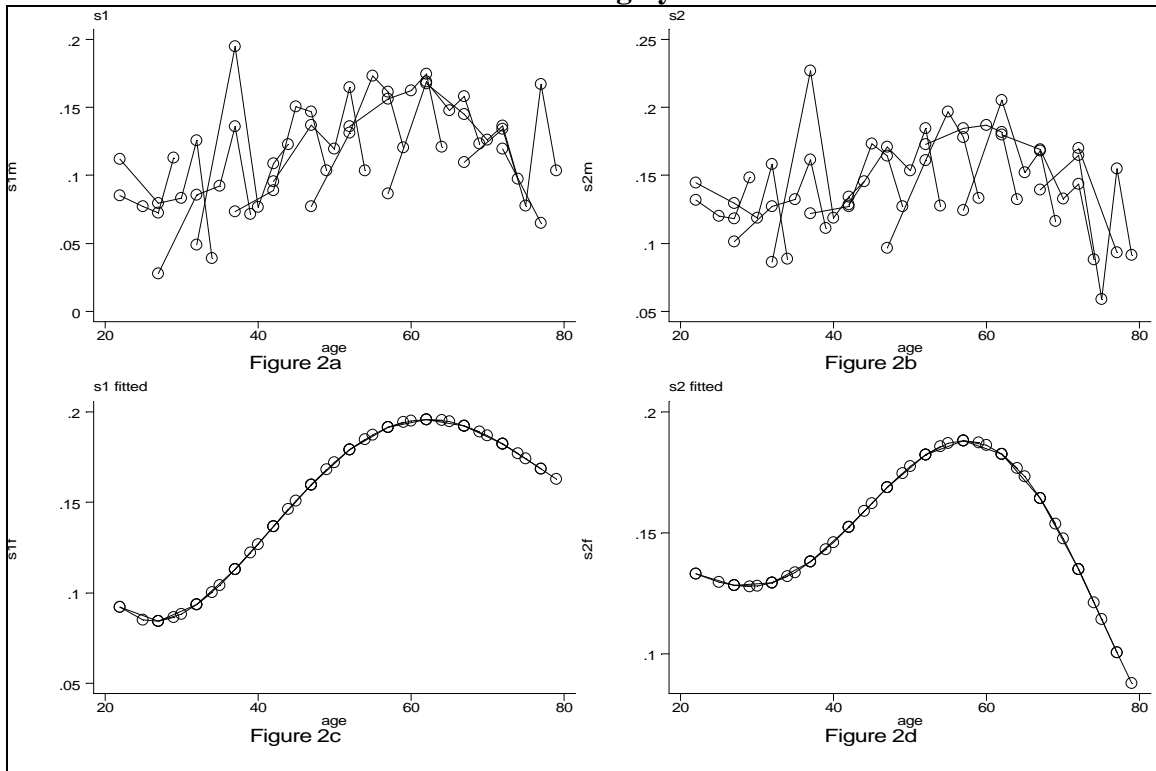
The evidence on consumption and income (as well as family size) is consistent with those from other countries. While the profiles for consumption do not resemble the simple picture of a textbook life cycle model and, on the contrary, seem to follow the pattern of income over the life cycle, this is not necessarily inconsistent with the life cycle model. The earning profiles and family needs may vary over the life cycle because of changes in

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probably the results in Figure 1 are exaggerating the increase in income and consumption. According to the surveys, household per capita incomes increased by almost 30% between 1984 and 1989, by 15% between 1989 and 1992, by 5% during 1992-1994, and collapsed by 28% between 1994 and 1996.

labour supply behavior and in family structure. Attanasio, Banks, Meghir and Weber (1998), for instance, show that changing demographics might generate the sort of hump shaped consumption profiles, which would obviously ‘flatten’ the hump in savings predicted by the simple model.

**Figure 2**  
**Household saving by cohort**

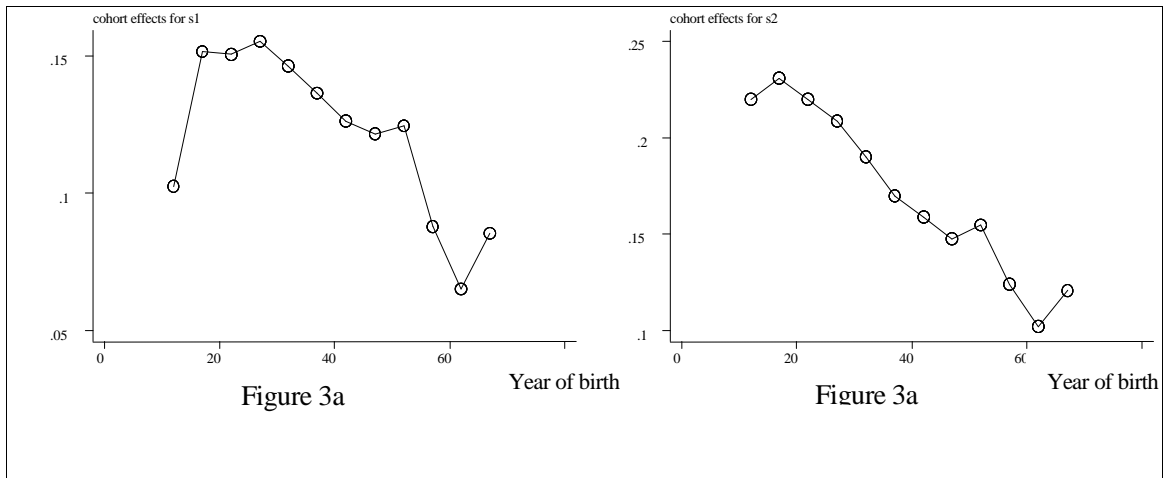


As mentioned above, a simple version of the life cycle predicts that, if income is hump shaped, saving rates will follow a similar pattern. The introduction of additional considerations, such as time varying needs, endogenous labour supply and so on, however, can explain deviations from this prediction. In Figure 2a and 2b we plot the age profile of average savings divided by average disposable income. The two graphs refer to our two definitions of savings. Both pictures are quite noisy. It is difficult to detect any definite pattern. To better identify the patterns in the picture we use a simple smoothing technique. Following the procedure used by Deaton and Paxson (1994) and Attanasio (1998), we normalize time effects so that they have zero mean and are orthogonal to deterministic trends. This is equivalent to interpreting all deterministic trends in the data



as a function of age and cohort effects. To measure these effects, we regress the saving rates on a 5<sup>th</sup> order polynomial in age and cohort dummies. In Figure 2c and 2d we plot the implied age profile for an arbitrary chosen cohort (the first). In Figure 3a and 3b, we plot the cohort dummies.

**Figure 3**  
**Cohort effects on saving**



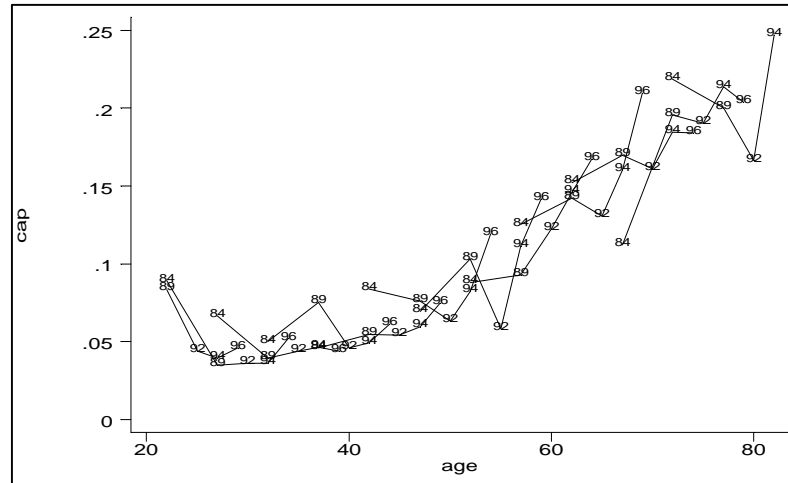
The age profiles indicate that, for both definitions, saving rates increase rapidly in the first part of the life cycle, are quite flat until around 60 and decline afterwards. While neither of the two definitions is negative in the aggregate, we do observe, especially for S2, a substantial decline.

If we now turn to the analysis of cohort effects, we see that in Figure 3, for both definitions, younger cohorts are saving systematically less than their older counterparts. The cohort specific intercept of the age polynomials is decreasing with the year of birth of the cohorts. The only exceptions are the first and last cohorts.

The concept of income we use in computing saving is not consistent with the concept relevant for the life cycle model. This is particularly true for the last part of the life cycle, as a large proportion of income is derived from pensions (and in part from capital) (See

Jappelli and Modigliani, 1997). These items could be thought of a sort of decumulation of previously accumulated assets. Figure 4 plots the proportion of income originated through transfers (most of which are pension incomes) and income from property rents (which most of the time come from running capital assets down), by cohort. The figure reveals that after 60 years of age an increasing proportion of household income is obtained by these sources. Apart from pension incomes, “transfers” include flows between households. So, even if the elderly do not join another relative’s household, there might still be strong family effects through inter-household income flows. If this effect is strong, income will be overstated and the old will appear to be saving more than they really are. Note that the proportions in Figure 4 become quite considerable around ages 75 to 80.<sup>18</sup>

**Figure 4**  
**Total household income divided by transfers and property rents**



The figures discussed so far can be quite misleading, as they represent the average behaviour of groups of households that are quite heterogeneous. In countries with high inequality levels such as Mexico, groups of individuals that save with totally different objectives will coexist. The saving rates of the cohorts plotted in Figure 2 can hide

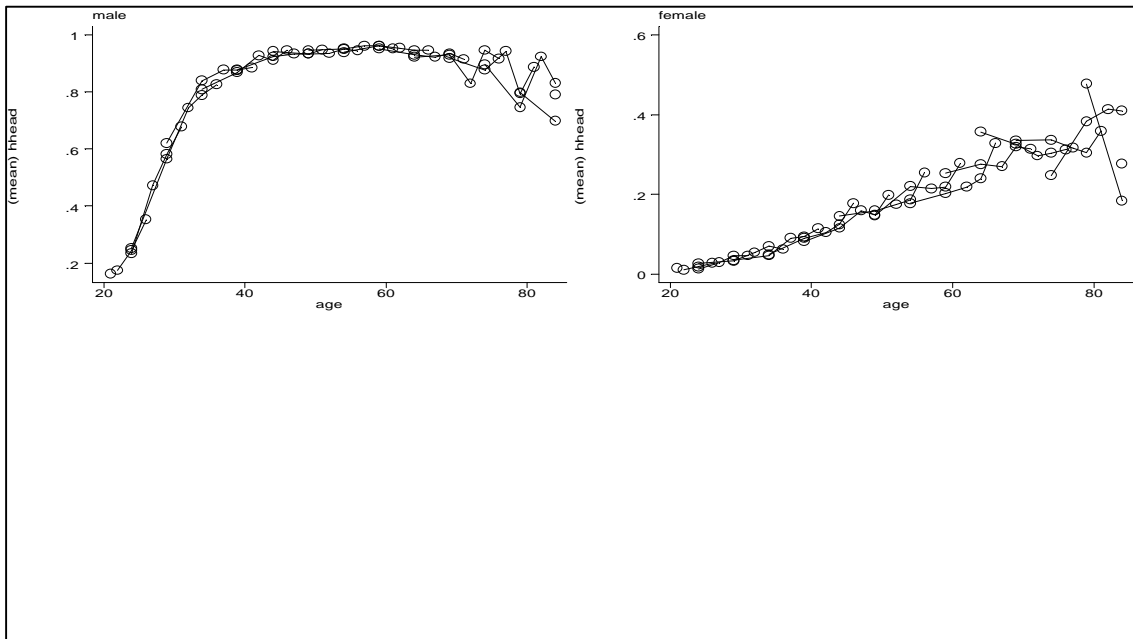
<sup>18</sup> Another reason why we might not observe hump shaped saving profiles is that individual households might expect to face costly health expenses when they reach the end of their life-cycle.

systematic differences among, for instance, different education groups. These differences can be particularly important if, during the sample period, there are changes in inequality among groups.

Before addressing in detail the issue of heterogeneity across education groups, in the remaining of this section, we try to determine how important the problems of endogenous household formation and dissolution discussed above can be.

As far as the formation and dissolution of households is concerned, the most likely problems might occur at the end and at the beginning of the life cycle. On the one hand, it is likely that elderly individuals who move to extended households do not constitute a random sample of individuals of a similar age. On the other hand, the individuals that first leave their parents are probably those most able to form a new family. In both cases, it is likely that these problems might introduce substantial biases in the estimation of life cycle profiles.

**Figures 5 and 6**  
**Proportion of males and females that are household head, by cohort**



One way to assess the importance of these problems is to plot the proportion of household heads in each cohort of *individuals* (rather than households). To construct Figures 5 and 6 we divide all the *individuals* in the sample into year of birth cohorts and compute the percentage of household heads for each gender (figure 5 plots males and figure 6 plots females). Particularly relevant for the considerations made above, is the slight decline of headship rates among men in the last part of the life cycle, probably reflecting the fact that some elderly move with their children. The increase in headship rates for women probably reflects the prevalence of widowhood among those age groups.

**Figure 7**  
**Average age of individuals, by cohort**

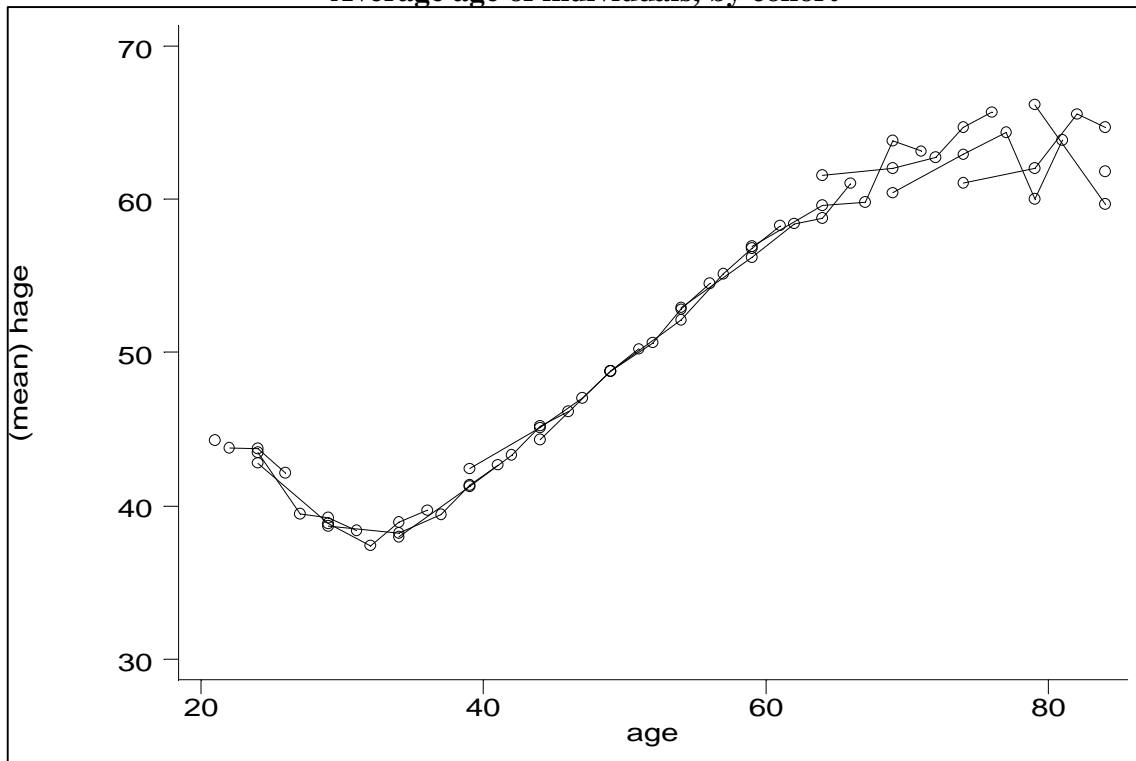


Figure 7 is also informative about the process of family formation and dissolution. Again considering cohorts of individuals, we plot, for each cohort, the average age of the head of the household where the individuals in a given cohort live. The decline in the first part of the life cycle indicates that many young adults are still living with their parents. The

increase almost along the 45 degree line during the prime ages indicates that most males are household heads in that part of the life cycle. The decline in the last part of the life cycle once again reflects the move of some adults with their children.<sup>19</sup>

### 3.2. Saving rates by education groups

The profiles in Figure 2 are derived averaging across a large number of households. These households might differ in the level of their permanent income and in the shape of the life cycle profile of current income. Therefore their incentives to save over the life cycle might be very different. It is, therefore, desirable to divide the population by variables that proxy for such an unobserved variable. Education attainment of the household head is an obvious choice for such a proxy. The analysis of different education groups is particularly interesting if different education groups present not only different levels of income, but also different shapes of income over the life cycle. Furthermore, their study is also interesting because, as we showed in section 2, there are some important shifts in the distribution of income and saving among these groups during the period under study. Additionally, if education is correlated with family formation and mortality, controlling for education might help in reducing the biases discussed above.

In this section, we present the life cycle profile for family size, income, consumption, as well as for saving rates of different education groups. We divide the data in three groups: The first one only refers to individuals with primary education or less; the second refers to those with secondary education, while the last is only for individuals with higher education.

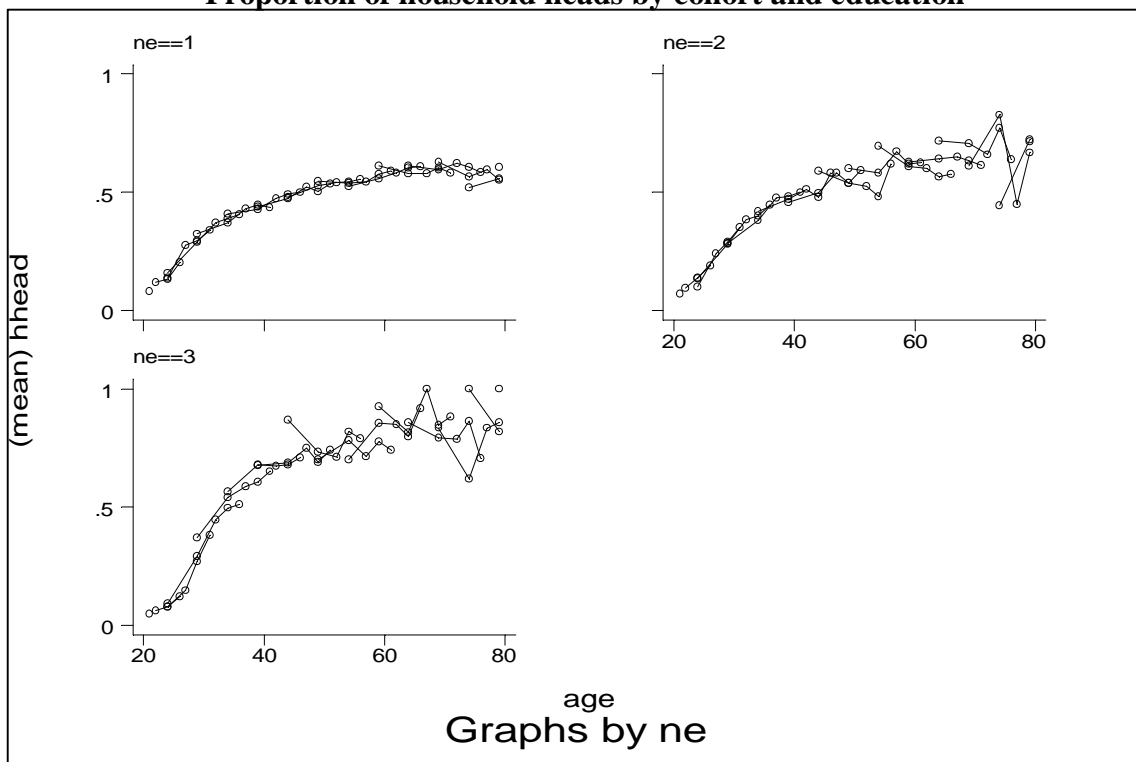
Before starting the analysis of the main variables of interest, however, it is worth having a look at the information on headship rates and average age of the household head by education group. This evidence complements that presented at the end of last subsection for the population as a whole. Figures 8 and 9 show the results. Perhaps the most interesting aspect is that the slope of the curves varies considerably by education. While

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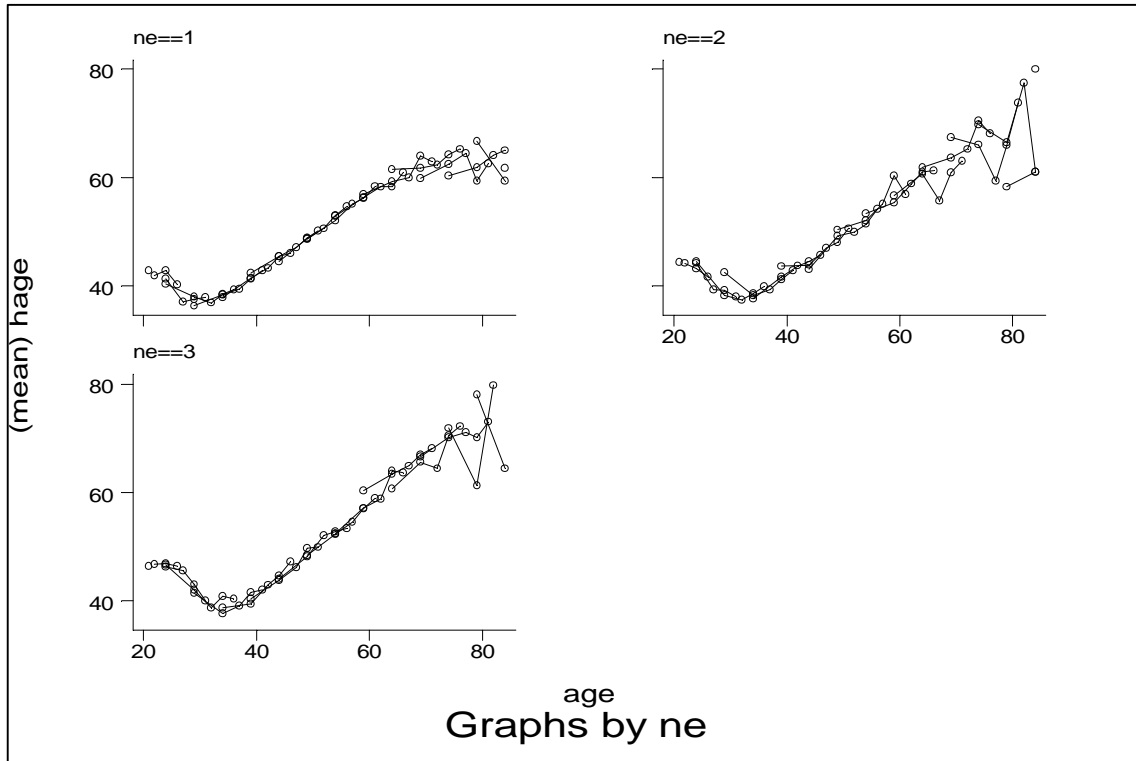
<sup>19</sup> The definition of household head in the Mexican surveys is the self reported one.

among the better-educated households there is a significant raise in the proportion of heads between 20 and 60 years of age, only around 50 or 60% of the heads with scarce education become heads after age 20. One interpretation is that at low incomes, individuals have to get together into larger families to take advantage of economies of scale. Figures 8 and 9 suggest that the systematic biases introduced by endogenous family formation (both at the beginning and especially at the end of the life cycle) might be particularly important for the poorest (and least educated) households. Uneducated individuals in prime age live in households where someone else (i.e. the head) is likely to have more influence in family decisions including savings, but this is not the case for those with higher education

**Figure 8**  
**Proportion of household heads by cohort and education**



**Figure 9**  
**Average age of the household head where individuals live, by education**



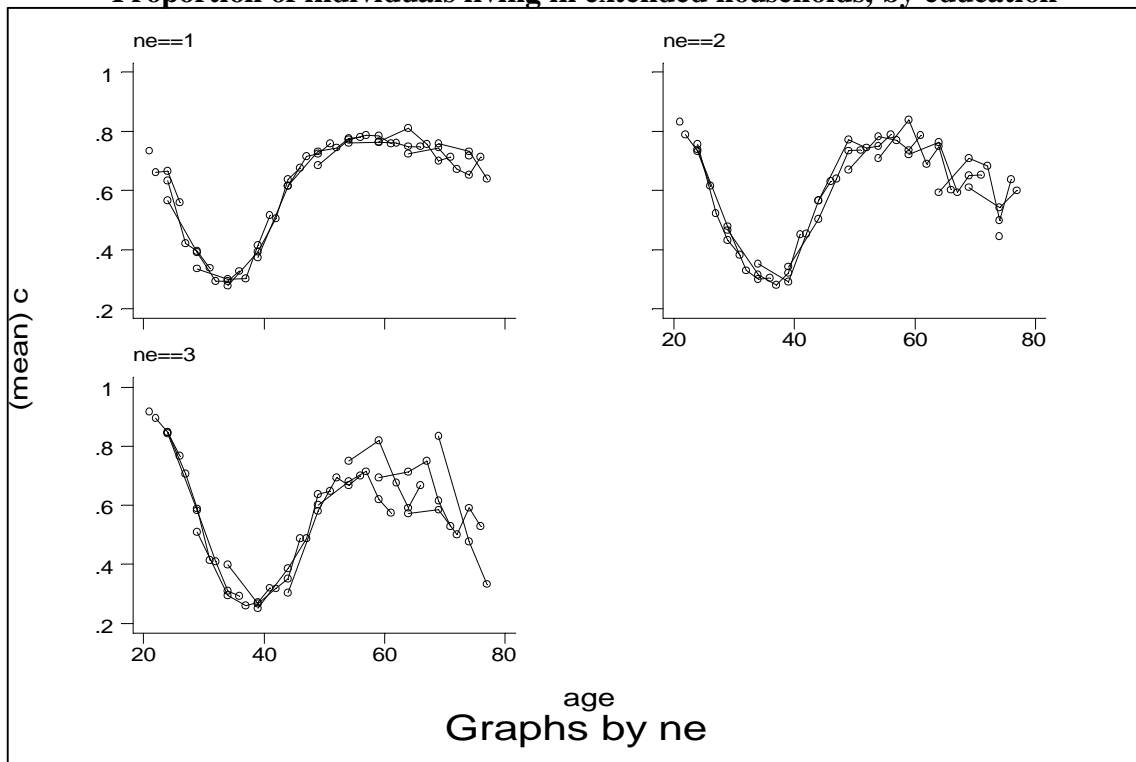
Another way of looking at these differences is by considering the proportion of people that live in extended households at different stages of the life-cycle. Figure 10 plots these proportions by education level of the household head.<sup>20</sup> Among people in the lowest education category, people join extended households especially after age 50. So, even if the elderly are dis-saving, we would probably not observe it because when we graph the saving rates we attach them to a household head that probably is not the elderly individual in question. According to Duryea and Székely (1998), 65% of the population over 25 years of age in Mexico is classified under the first education category, and may therefore have a strong influence over the pattern we observe in Figure 2.

For individuals with secondary education, we observe a slight tendency toward living in nuclear and single person units as they age. So, in their case we would expect that the

<sup>20</sup> Extended households are defined as those where a nuclear family plus other family members live. Nuclear families consist of one or two parents and their children.

composition effects induced by endogenous family dissolution to be smaller. Finally, in the case of individuals with higher education the family effect seems to be much less significant than in the case of the first group. The third panel in figure 10 actually shows that there is a strong tendency to go from extended households toward nuclear or single-person units when educated people age. Probably this is because individuals with higher permanent incomes can “afford” to live on their own after retirement, and do not need to rely on a family network to maintain their consumption.

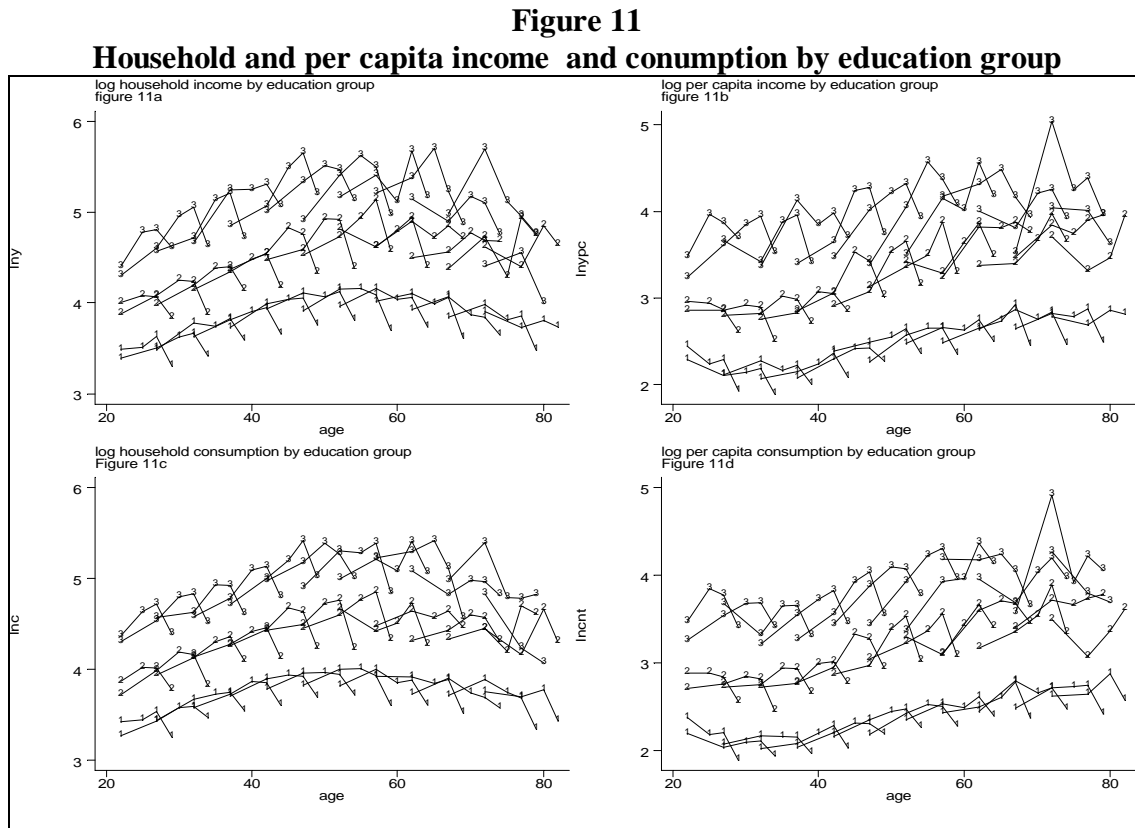
**Figure 10**  
**Proportion of individuals living in extended households, by education**

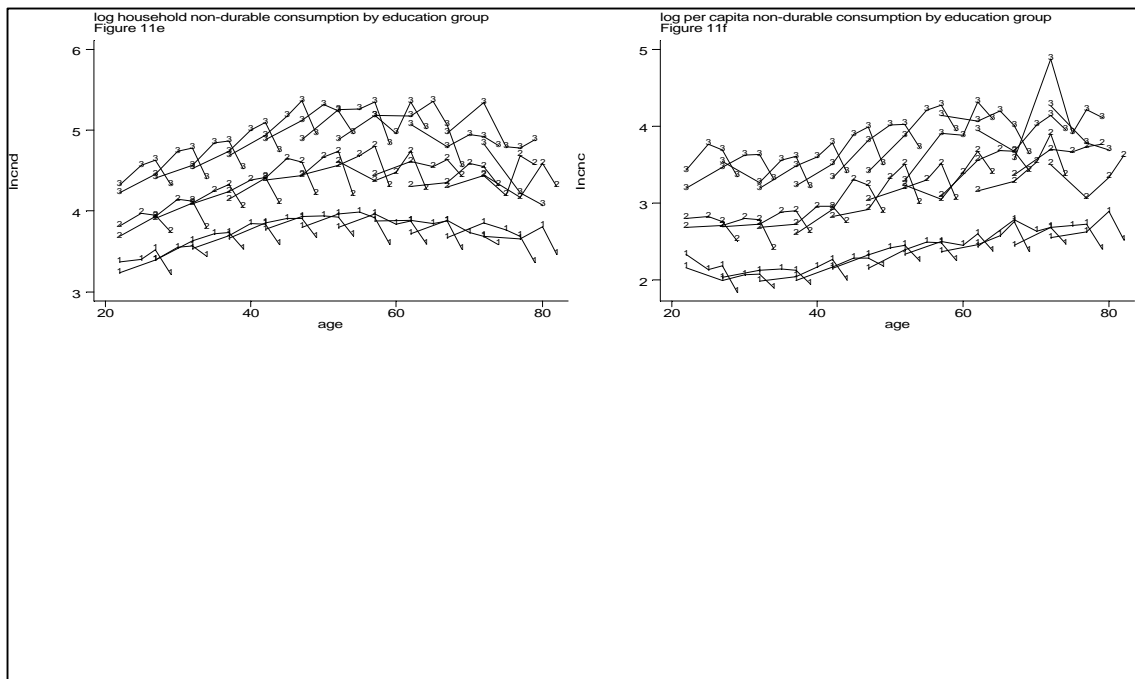


In sum, one of the reasons why Figure 2 does not display the expected hump-shaped curve, could be that specially among the people with lower permanent income (who are a majority), there is a strong family effect. People tend to shift toward extended households when they age, and this blurs the picture about their saving behavior after retirement.



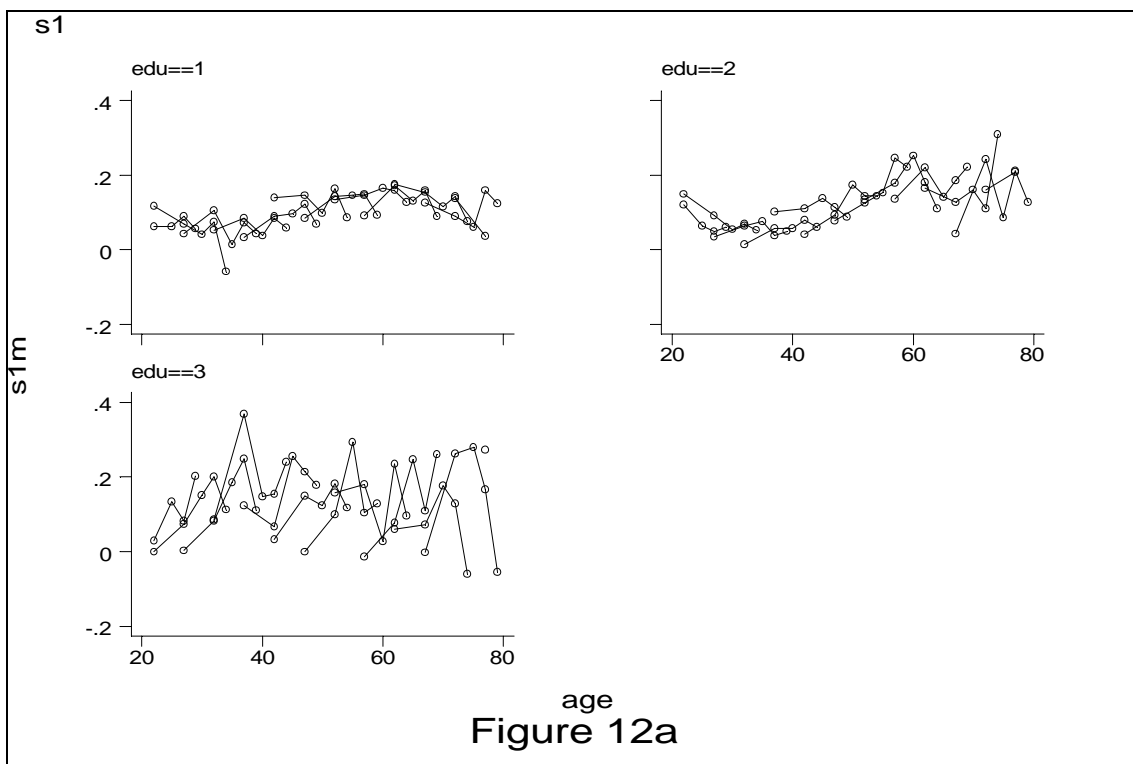
Before looking at saving rates by education, it is useful to examine the components of saving. Figure 11 contains this information. As expected, income and consumption increase with education. Perhaps the most interesting aspect of panels 11a, 11c and 11e (which plot household income, total consumption, and non-durable consumption, respectively) is that the hump-shaped profile is much more pronounced among the households whose head has higher education. For the other groups, they are flatter. This is especially true among the households with uneducated heads. Similarly to the graphs for the population as a whole, there seems to be a large negative time effect in 1996. The per capita income profiles (plotted in panels 11b, 11d, and 11f) are much flatter.

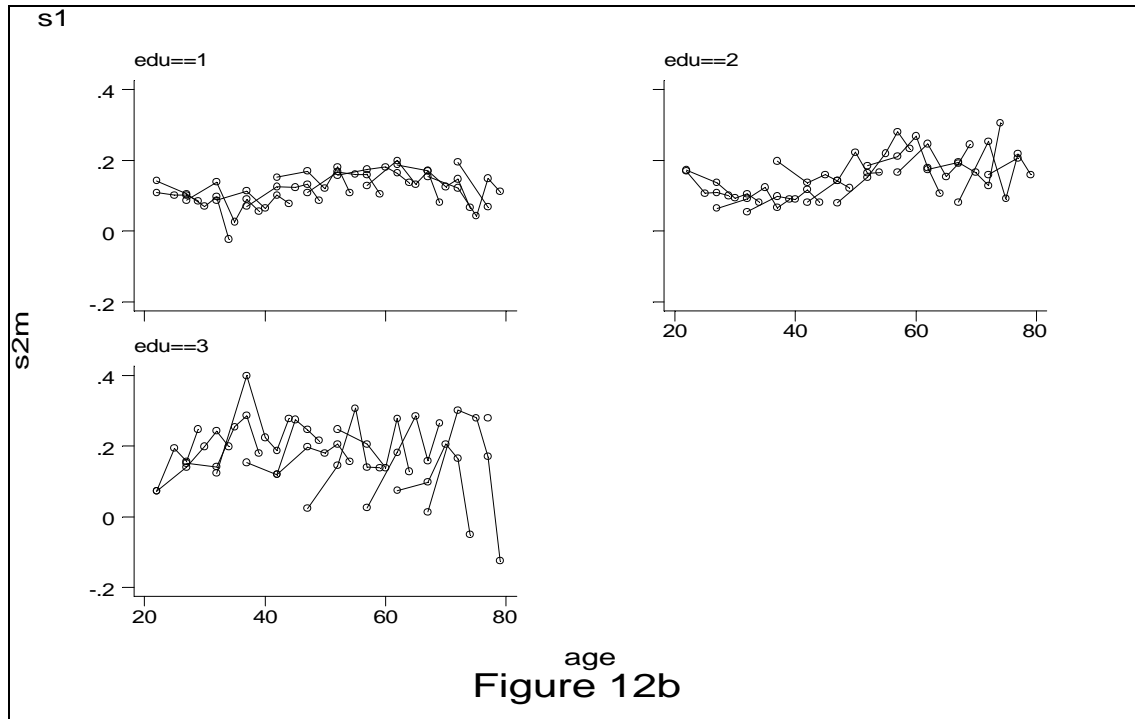




**Figure 12**

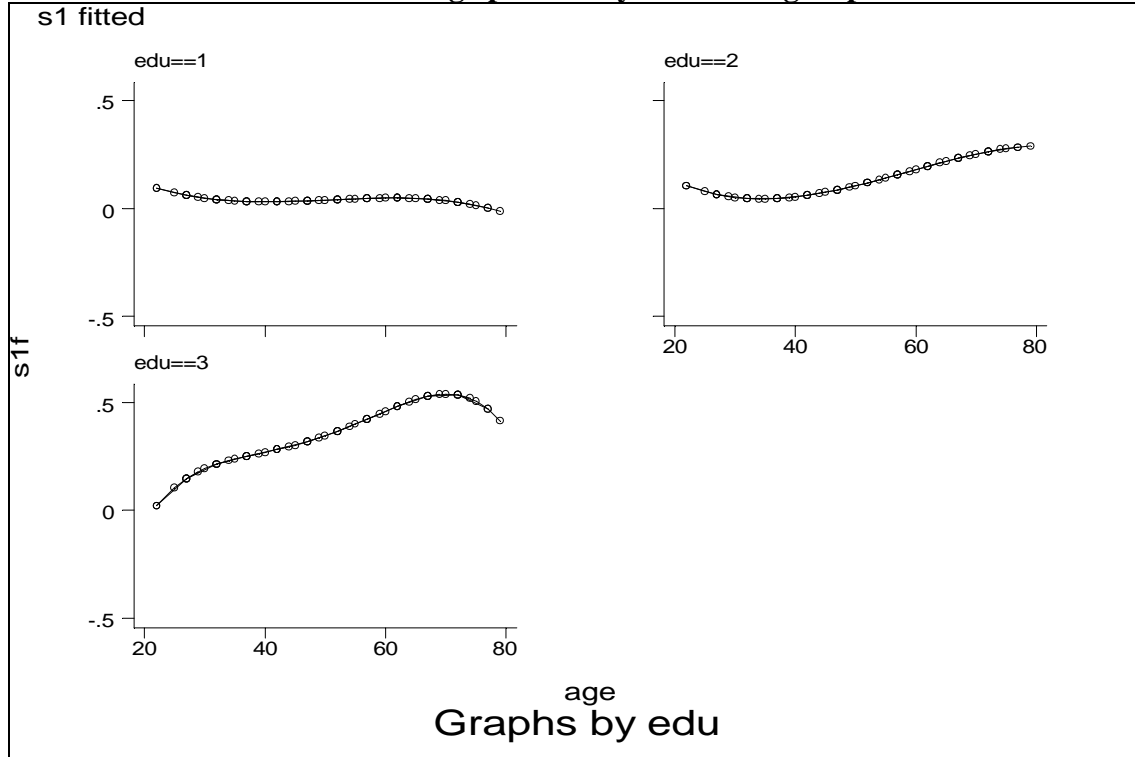
### Household saving rates by cohort and education





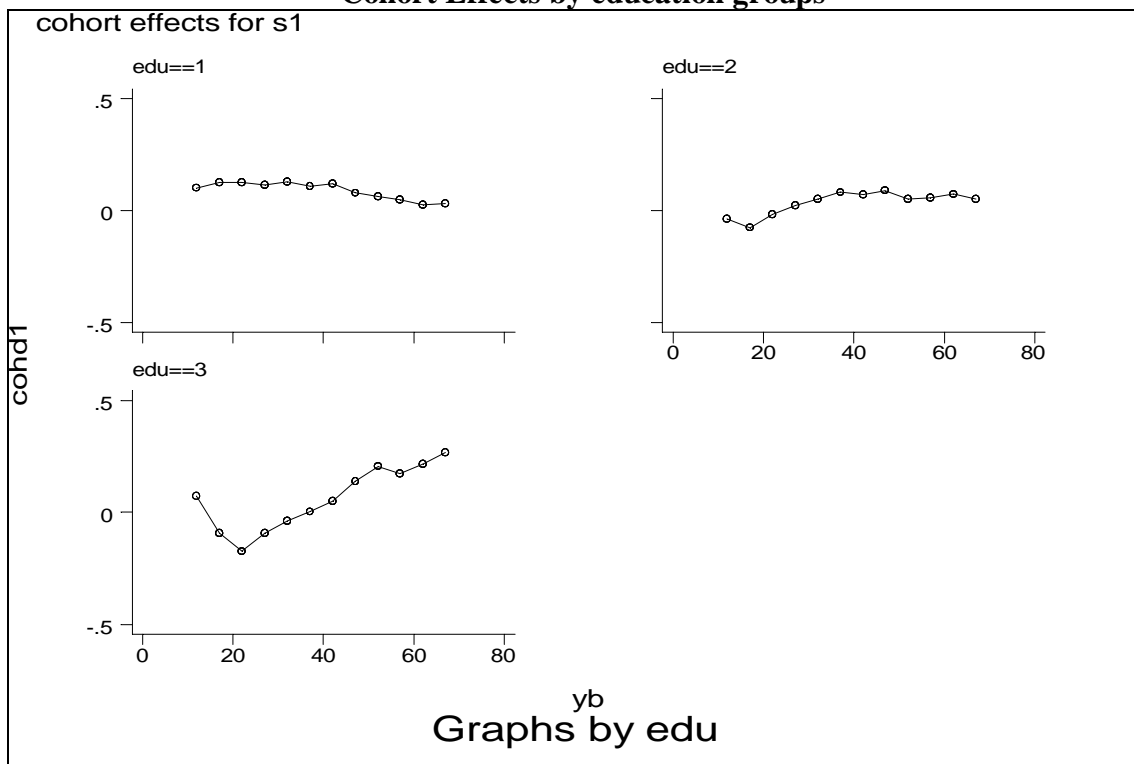
Figures 12a and 12b plot the same saving rates as the top panels of Figure 2. In this case, however, household heads are divided by education level to check if there are significant differences among households located at different points of the income distribution. Once again, the pictures are quite noisy. This is particularly true of the graph for the best-educated group. It should be remembered that many of the cells for this group are quite small, especially for the oldest cohorts. In an attempt to smooth the profiles in Figure 12 and identify age and cohort effects, we perform an exercise similar to that executed to derive Figures 2c and 2d as well as Figure 3. However, in this case we used a 3<sup>rd</sup> order polynomial for the first two education groups and a 4<sup>th</sup> order polynomial for the third group.

**Figure 13**  
**Smoothed age profiles by education group**



We report the smoothed age profiles for the three education groups in Figure 13. The profile for the first education group is much flatter than those of the two other groups. This is probably a consequence of the much flatter income profile of this group. The profile for households whose head has secondary education increase slightly throughout the life cycle, and in the case of the highly educated, an increase up to age 70 with a slight decline at the end, is observed. These results, as they are based on relatively small cells, should be taken with much caution.

**Figure 14**  
**Cohort Effects by education groups**

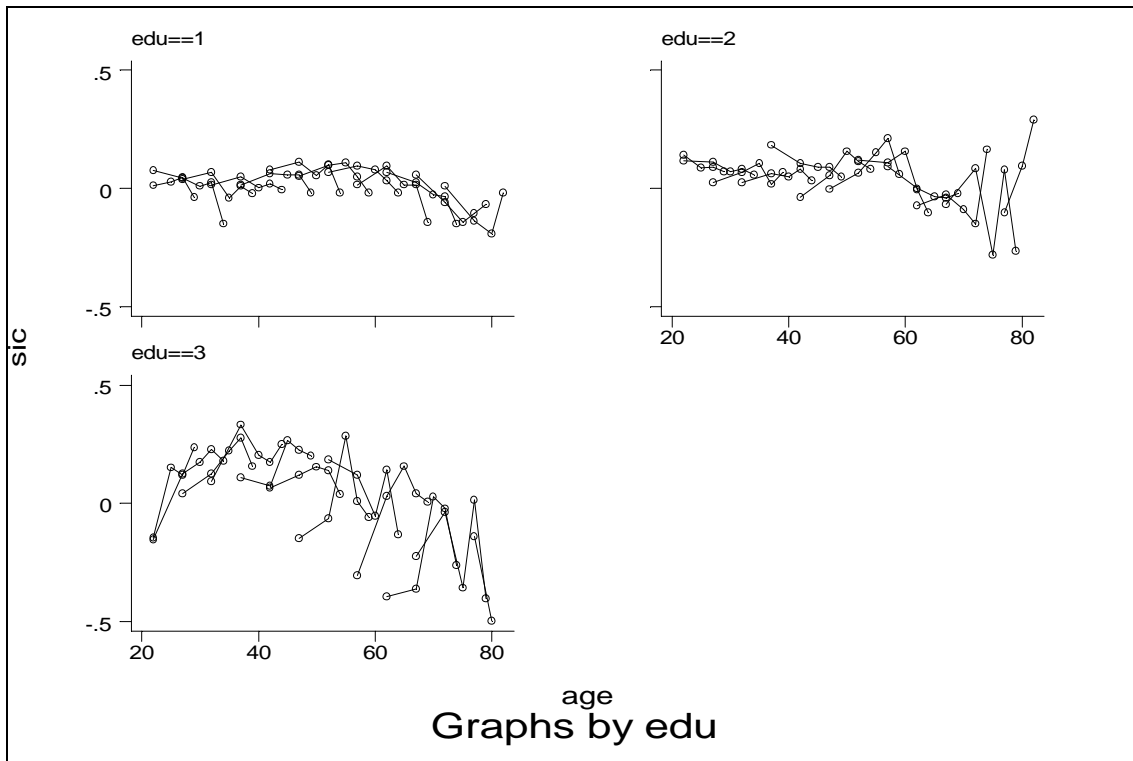


The cohort effects are plotted in Figure 14. These indicate relatively flat cohort effects for the first two groups. The third group, however, shows strong positive cohort effects that reflect long term changes in behavior: the youngest cohorts seem to be saving more than their predecessors were.

As mentioned above, the concept of income used so far in this subsection is not fully consistent with the life cycle model because the traditional definition of income in household surveys includes pensions and property rents, which are better characterized as decumulation of past saving. Since pensions and capital income tend to be highly concentrated among rich households, it is necessary to look at their effect across different education levels. Figure 15 plots saving rates similar to those in figure 12. In this case, however, we subtract transfers (most of which are pension incomes) and income from capital rents from the household's total disposable income. While the life-cycle profile of saving for households whose head has low education appears to be mostly flat, the saving

rates for those with some secondary education and specially, for the well educated show a decline after age 60. As compared with the results for household whose head has higher education in Figure 12, the saving profiles for those with higher education “adjusted” by subtracting transfers and capita rents is more hump shaped than before.

**Figure 15**  
**Household saving calculated by subtracting transfers and capital income**



Our results seem to suggest that households with the most educated heads behave more in line with the life-cycle theory than other population subgroups. They appear to dis-save more while young, increase saving in prime age, and dis-save markedly after retirement. The saving rates of households with secondary education also show a decline toward the end of the life cycle, but it is not as pronounced as the ones found in panel 15c. In contrast, those with low education save much less, and have a flat pattern throughout. It should be stressed however, that these results are not conclusive. One reason is that only a minority of households belong to the category of the better educated. This introduces more measurement error and it could be one of the reasons why their age-

saving profile looks more “noisy”, especially at older ages where cells are smaller.<sup>21</sup> Another reason is that as mentioned before, the Mexican household surveys do not provide information on “forced” saving through private pensions and social security contributions. Therefore, households whose members have a formal sector job (that requires such payments by law) are probably saving more than is apparent from figure 15. Figure 16 presents some evidence on this. Notice first that the proportion of income-earners that are in the formal sector is much higher among the two groups with secondary education or more, and very low among those with low education. So, this issue is more relevant for the second two groups, and especially for households whose income earners have higher education. Furthermore, the proportion of individuals with formal sector jobs declines in all cases toward the end of the life cycle. Therefore, it is likely that saving are underestimated at prime age (if “forced” saving are significant, the real patterns for the second and third education groups should be more hump shaped than they appear to be), but the effect on individuals after age 60 is not likely to be large.

As with the saving rates in Figure 12, we smooth out the profiles in figure 15 to identify age and cohort effects. In Figure 17 we report the smoothed age profiles. The picture that emerges is slightly different from that of Figure 13. Now the profile for the group with the lowest education has a clear negative slope. Perhaps this is because a large proportion of these households is close to subsistence<sup>22</sup> (see Figure 11). Since the vast majority of the people living in households whose head has low education work in the informal sector, they are likely to face proportionately more risk. Thus, the negatively sloping age-saving profile may reflect an attempt to accumulate a buffer stock of saving at the

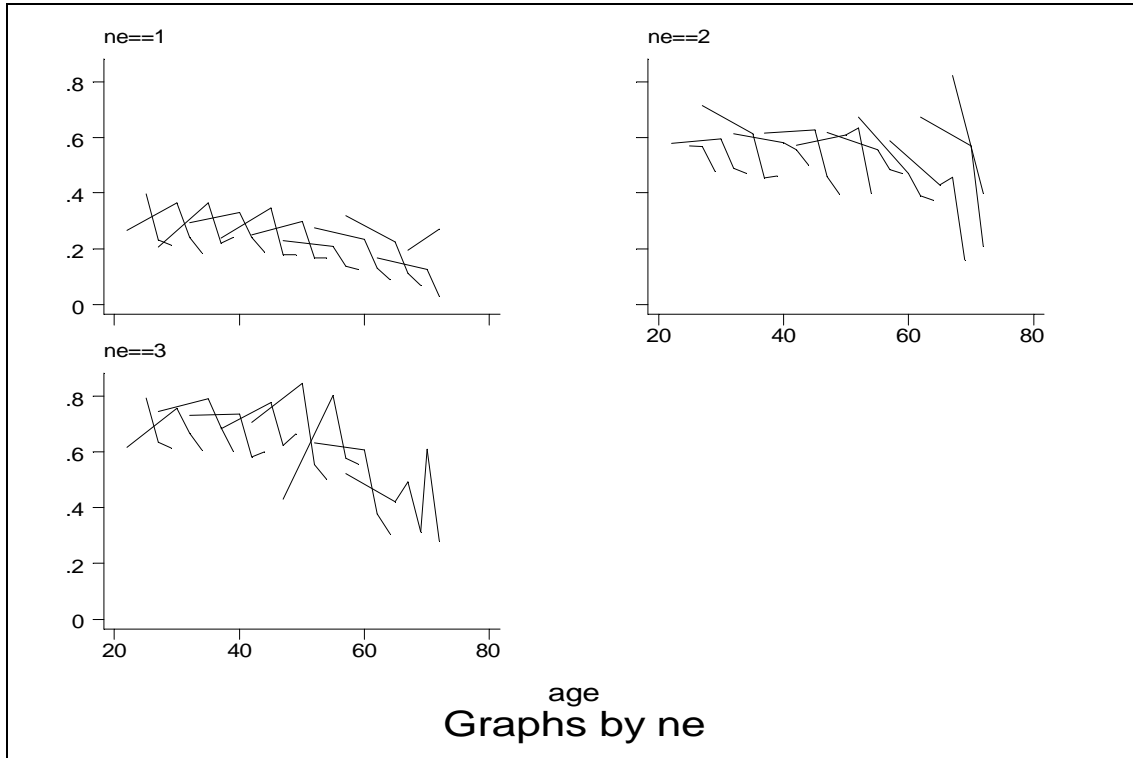
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<sup>21</sup> It could also be argued that the profiles are probably biased by differences in under reporting across income (and thus education) groups. Income under reporting is usually concentrated at the tails of the distribution, on the one hand, because it is usually more difficult to measure the incomes of the poorest rural households that receive large proportions of their resources as payments in kind, gifts and transfers. On the other, all households tend to under report incomes from capital and property, and since larger proportions of the incomes of the rich come from these sources, these groups are more prone to this type of measurement error. This could be a problem for the conclusions driven from the figure, because there could also be differences in under reporting across the life cycle (and particularly among the elderly who usually rely on non-labor income sources. However, it should be remembered that the figure was constructed by subtracting all incomes from property rents from the estimation, so the extent to which the figures are driven by differences in under reporting across the life cycle, is minimized.

<sup>22</sup> Lustig and Székely (1998) show for instance, that around three quarters of the poor have either no education or only primary education.

beginning of the life cycle, when a large proportion of income uncertainty is still unresolved.

**Figure 16**  
**Proportion of income earners working in the formal sector by education groups**

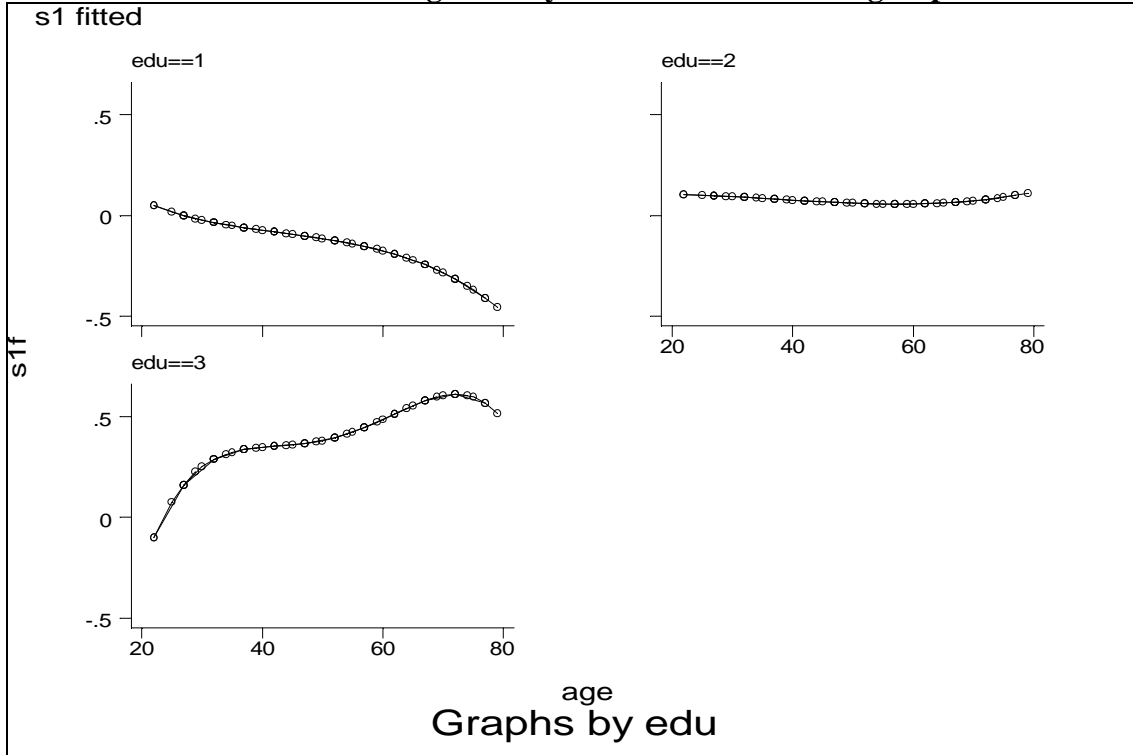


The smoothed age profile for those with secondary education looks much flatter than in figure 13, while for the group of households whose head has higher education there is still a marked positive trend with a slight decline by the end of the life cycle.

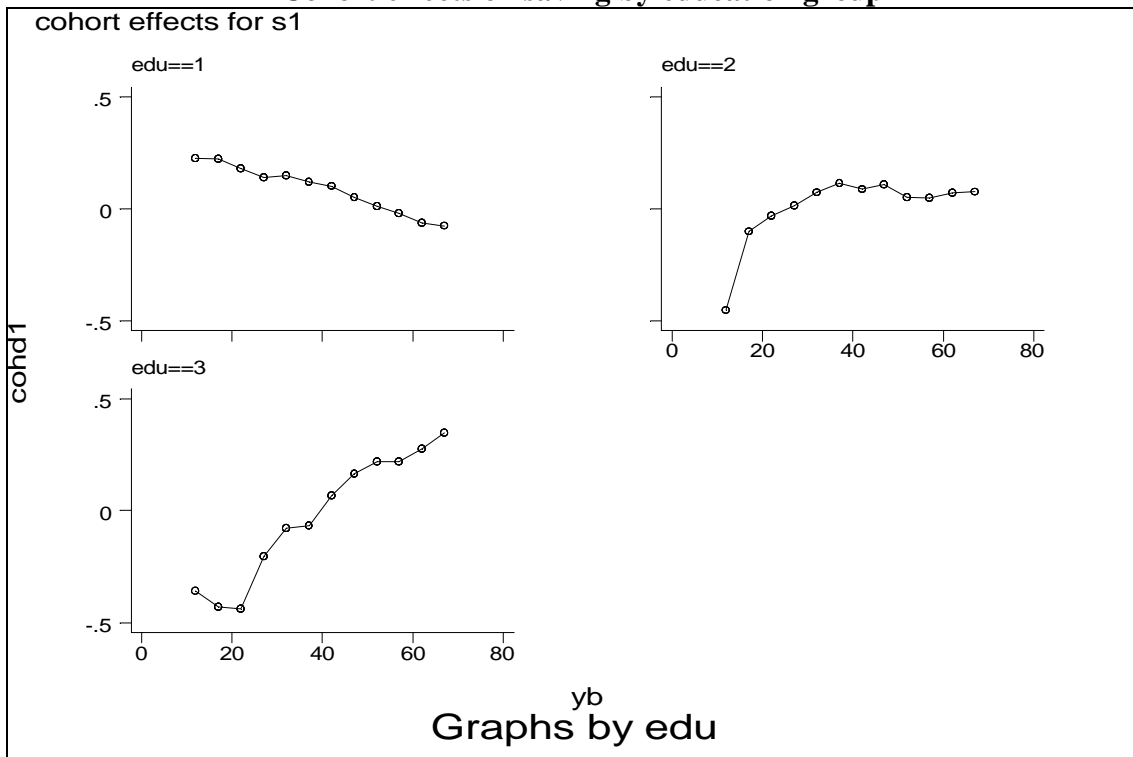
Figure 18 plots the cohort effects. In this case, the main difference is that for all education groups, the cohort effects are stronger. The decline between older and younger generations of uneducated household heads is now larger. For those with secondary education there is an increase among the generations born between 1910 and 1930, although the cohort effects still flatten out for the generations born after 1940. For the highly educated the positive cohort effects are also larger.



**Figure 17**  
**Household saving rates by cohort and education groups**



**Figure 18**  
**Cohort effects on saving by education group**



#### 4. Short term fluctuations in income and consumption

So far we have focussed on average income, consumption and saving profiles, either for the whole sample or for groups defined by the education attainment of the household head. The distributional issues we have focussed on relate to difference *across* groups, rather than differences *within* groups. The evidence we have presented indicates the existence of substantial differences in saving behaviour both across education groups and across cohorts. To shed light on the nature and causes of these differences it might be worth investigating changes in the distribution of resources *within* groups. While the lack of longitudinal data limits the extent to which we can investigate differences in life cycle profiles *within* groups, the dynamics of the cross sectional variance of wages, income and consumption is informative for at least two reasons. First, using time series of repeated cross sections one can characterize the life cycle pattern of the within group variances of consumption and income and check whether these patterns conform to the implications of the life cycle model. This is the approach taken by Deaton and Paxson (1994). Furthermore, changes in the variance of income and consumption can be used, following the approach recently proposed by Blundell and Preston (1998), to identify the changes in the variance of permanent and transitory components of income.

Deaton and Paxson (1994) stressed that a simple implication of some versions of the life cycle model is that, for any given group, the cross sectional variance of (a transformation) of consumption should be, on average, increasing over long periods of time. This is particularly true over those parts of the life cycle where uncertainty in the permanent components of income is important. This implication can be checked by identifying the age profile for the cross sectional variance after correcting for cohort effects, as we have done for the means of the relevant variables in Section 3.

Blundell and Preston (1998) exploit a very simple implication of the permanent income model to identify the changes in the variances of transitory and permanent components of income. The cross sectional variance of income for a certain cohort at a certain point in time reflects both permanent and transitory differences. If consumption is a function of permanent income only, the cross sectional variance of consumption reflects only

differences in permanent income across individuals.<sup>23</sup> Therefore, changes in the variance of consumption will reflect changes in the variance of the permanent component of income. Furthermore, changes in the cross sectional variance of income will reflect changes of both the permanent and transitory components of income. Therefore, one can identify the changes in the variance of the transitory component by considering the difference between changes in the variance of income and that of consumption. Changes in the variance of the permanent component can then be obtained by considering the first differences of the changes in the variance of consumption. To be more specific, if income is given by:

$$y_t = u_t + v_t$$

$$u_t = u_{t-1} + e_t$$

where  $u$  and  $v$  are the permanent and transitory components of income and  $v$  and  $e$  are assume to be i.i.d., Blundell and Preston show that under certain conditions, the changes in the variance of  $v$  can be approximated by the difference in the changes in the variance of income and the variance of consumption:  $\Delta \text{var}(v_t) \cong \Delta \text{var}(y_t) - \Delta \text{var}(c_t)$ . On the other hand the variance of the innovation to the permanent component of income can be approximated by the changes in the cross sectional variance of consumption:  $\text{var}(e_t) \cong \Delta \text{var}(c_t)$ .<sup>24</sup>

Decomposing changes in inequality in those parts that can be attributed to transitory components and to the permanent component is important for two reasons. First, because it can help to understand the type of shocks households are subject to; and second because different shocks are likely to have very different implications for saving behaviour and, more generally, for the demand for insurance and the ability to smooth out shocks individuals have.

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<sup>23</sup> For expositional simplicity we are neglecting a number of important details, such as the necessity of taking into account needs, different horizons and the like. For details, see Blundell and Preston (1998). These authors also use information on changes in the covariance between consumption and income to derive over-identifying restrictions to be tested on the data.

<sup>24</sup> These equalities are easily proved in an infinite horizon case with quadratic utility. Blundell and Preston (1998) show that they generalize to alternative utility functions and that one can also derive the changes in the variance of the permanent component from the changes in the covariance between consumption and income.

Table 6 looks at changes in inequality in Mexico. As in other data sets consumption is less unequal than income. Both income and consumption inequality, as measured in the surveys, increased very sharply between 1984 and 1989, and stayed roughly constant afterwards. What is interesting is that consumption inequality increased by much more. This might imply an increase in the variance of the permanent component of income and a decrease in the variances of its transitory components.

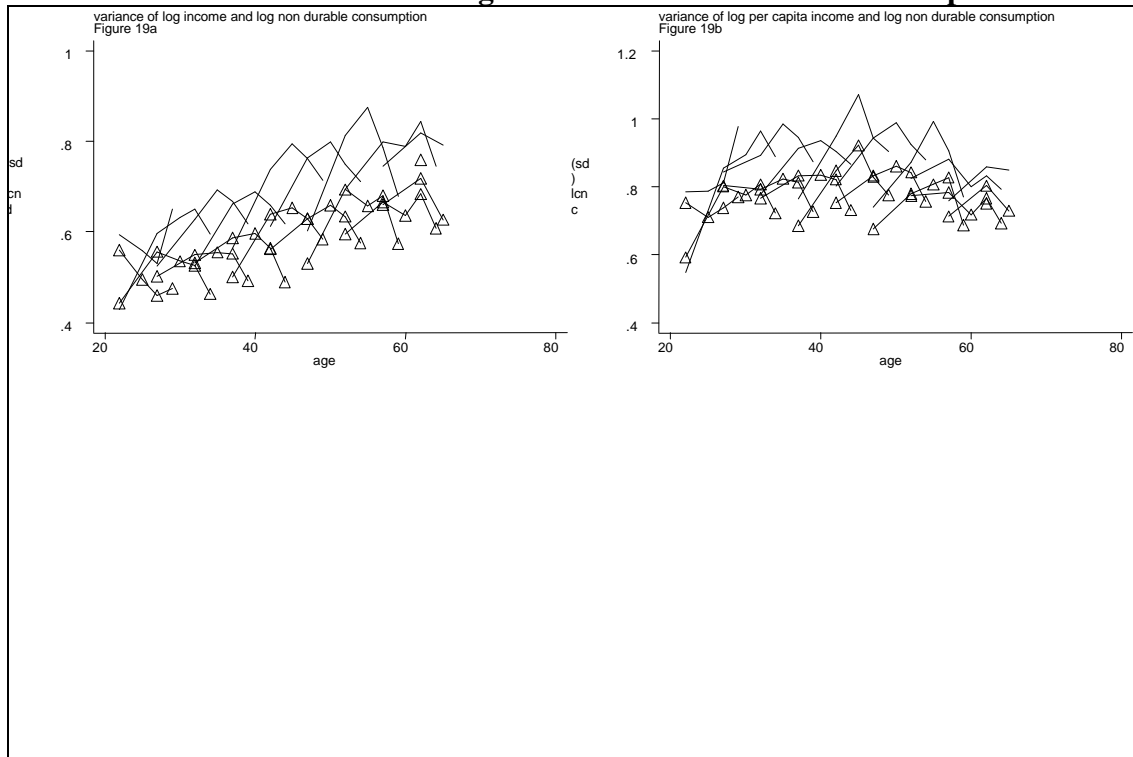
<b>Table 6</b> <b>Measures of Inequality, 1984-1996</b>									
Year	Gini Coefficient			Coefficient of Variations			Standard deviation of logs		
	Total Income	Wages	Expendit.	Total Income	Wages	Expendit.	Total Income	Wages	Expendit.
1984	47.40	47.83	40.36	1.23	1.20	1.18	1.23	1.14	0.85
1989	53.12	50.94	50.47	2.31	2.97	1.73	2.31	1.16	0.90
1992	53.13	54.74	50.18	1.62	1.87	1.32	1.62	1.16	0.90
1994	54.04	55.71	50.87	1.60	1.91	1.37	1.60	1.24	0.89
1996	53.11	54.75	49.20	1.65	2.33	1.35	1.65	1.18	0.87
Changes (%)									
1984-89	12.07	6.50	25.05	88.14	148.59	47.16	88.14	2.25	5.76
1989-92	0.02	7.47	-0.57	-30.17	-37.20	-23.68	-30.17	0.23	0.67
1992-94	1.71	1.77	1.38	-1.02	2.48	3.78	-1.02	6.15	-0.89
1994-96	-1.72	-1.72	-3.28	3.29	22.00	-1.64	3.29	-4.21	-2.62
1984-96	12.05	14.47	21.90	34.31	95.17	14.65	34.31	4.21	2.75
Source: Calculations from household survey data									

The figures in Table 6, however, refer to inequality in the whole sample. As Blundell and Preston point out, however, this can be quite misleading. In what follows, therefore, we will consider the evolution of inequality for different groups. Before attempting the identification of changes in the variance of permanent and transitory components of income, we show some evidence on the life cycle pattern of inequality in income and expenditure.

#### 4.1. The life cycle profile of inequality in income and expenditure

As mentioned above, Deaton and Paxson (1994), show that, under certain assumptions, the cross sectional variance of the marginal utility of consumption should, over long periods of time and on average, increase in time. If needs are constant over the life cycle and utility is isoelastic, the (log) of the marginal utility of consumption can be approximated by the log of consumption. Alternatively, if needs change systematically over time, one possibility is to consider the log of consumption per adult equivalent. As the estimation of adult equivalent schemes for Mexico is behind the scope of this paper, we report results obtained using per household consumption and per capita consumption. As a measure of consumption we will use expenditure on non-durable consumption. This simplification, which allows us to avoid the intertemporal non-separability induced by durable consumption, implicitly assumes separability between durables and non-durables.

**Figure 19**  
**Within cell variance of log income and non-durable consumption**



In Figure 19 we plot the within cell variance of (log) income and non-durable consumption for the whole population.<sup>25</sup> This graph is analogous to those reported by Deaton and Paxson (1994) for the UK, the US, Taiwan and Thailand. The left panel, that plots the cross sectional variance of (log) household income and consumption, shows a roughly increasing life cycle profile, even though fairly strong year effects are present. In particular, one observes a marked decline in the cross sectional variance of both consumption and income in 1996. Furthermore, the cross sectional variance of income seems to increase more rapidly than that of consumption over time. The right panel, which plots the variance of *per capita* income and consumption, tells quite a different story. While, the decline in the cross sectional variance of both income and consumption in 1996 is still evident, the age-profiles except at the very beginning of the life cycle, look relatively flat. This might be interpreted as evidence that most of the uncertainty in income is resolved relatively early in life.

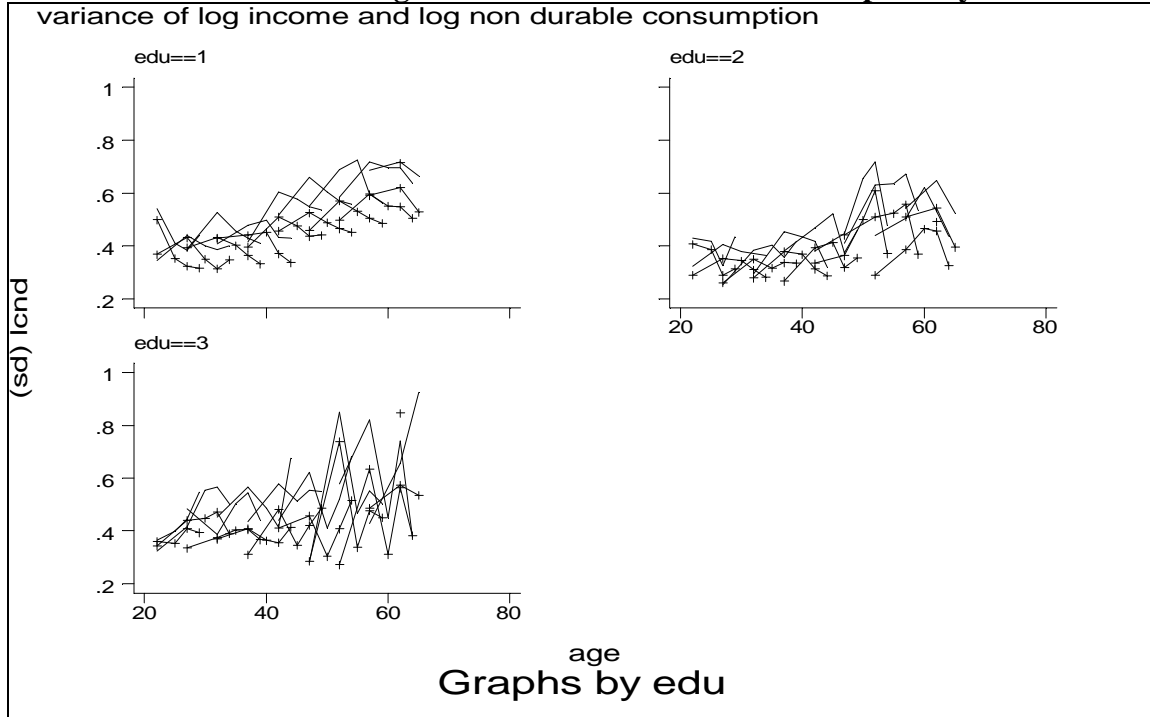
Figure 19 considers the whole sample and does not distinguish different education groups. However, if the returns to education have changed dramatically over the sample period, the patterns evident in Figure 19 could be quite misleading. Therefore, in Figure 19a and 19b, we plot the variances of log income and non-durable consumption for the three education groups considered above; as before the two graphs were obtained using household and per-capita figures respectively. Once again the profiles for the per capita figures are much flatter than those for the household figures. Furthermore, they are also much noisier. There seems to be no tendency for the cross sectional variance of per capita consumption or income to increase with age. These results contrast strongly with those obtained by Deaton and Paxson (1994) for the US, UK, Thailand and Taiwan and by Attanasio and Jappelli (1997) for the US, the UK and Italy.

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<sup>25</sup> As with the previous pictures we use only un-weighted data. The pictures for the weighted data are, however, very similar.

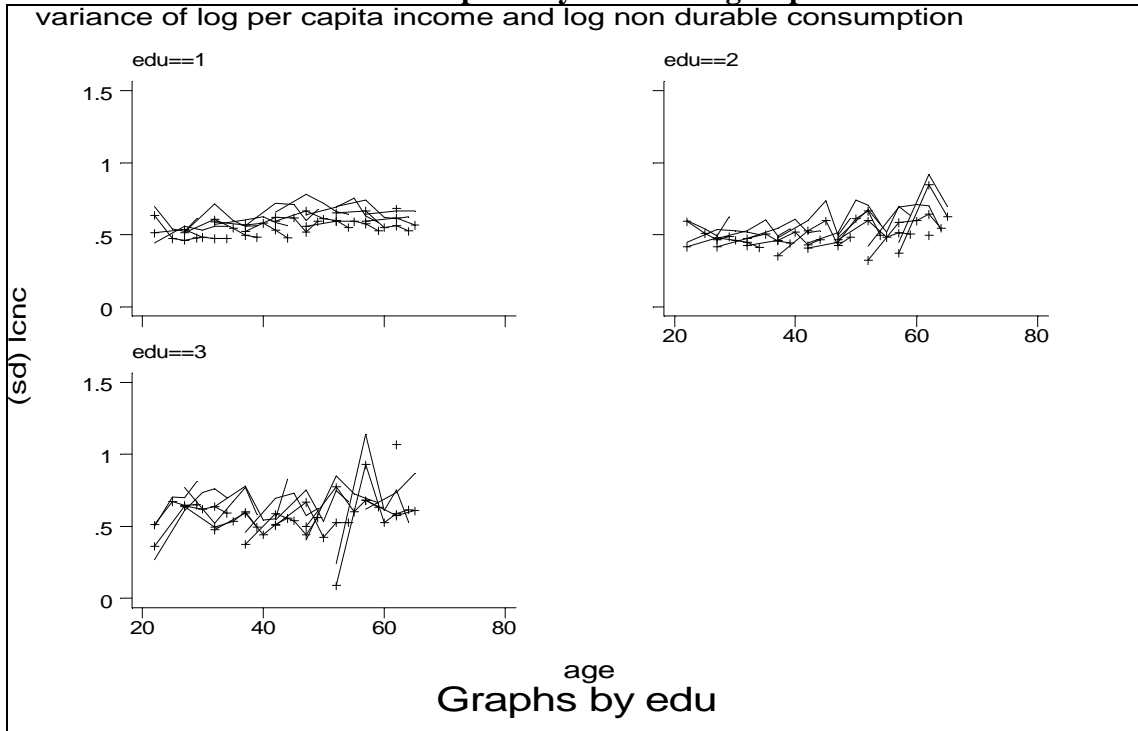
**Figure 19a**

**Within cell variance of log income and non-durable consumption by education**



**Figure 19b**

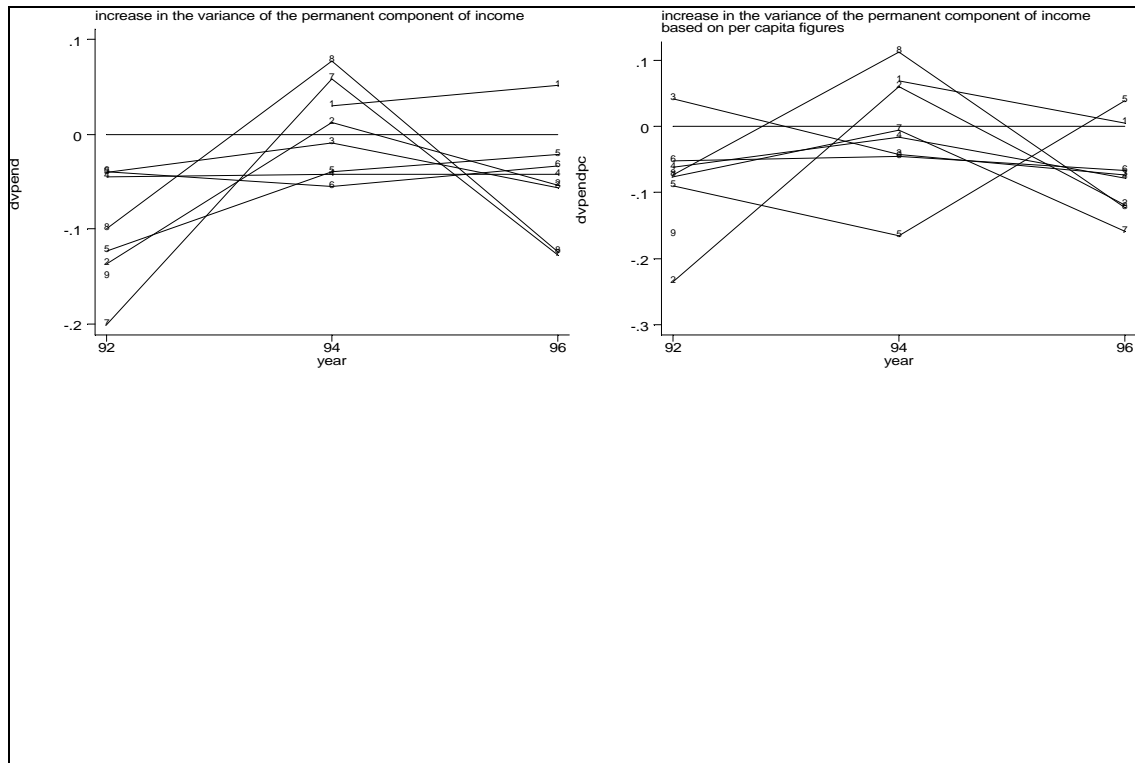
**Within cell variance of log per capita income and log per capita non-durable consumption by education group**



## 4.2. Decomposing changes in the variance of income

Following Blundell and Preston (1998), we use the information on the evolution of the cross sectional variance in income and non-durable expenditure to decompose changes in the variance of permanent and transitory components of income. What follows differs from Blundell and Preston (1994) in two important ways. First, as above, we consider both per household and per capita variances. Second and more importantly, we consider both the analysis of the whole sample and the analysis by education groups.<sup>26</sup>

**Figure 20**  
**Changes in the variance of the permanent component of income**



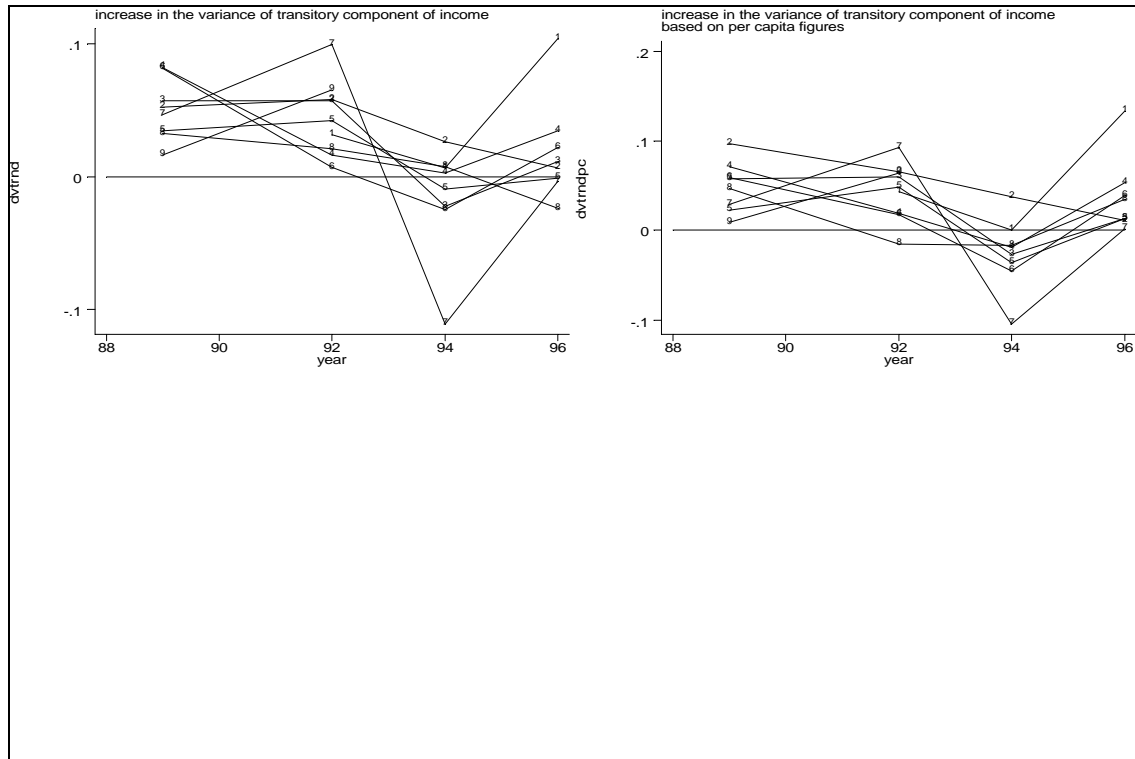
In Figure 20, we plot the change in the variance of the permanent component of income against year. We include in the graph only the cohorts in our sample observed under the age of 66. Each connected segment refers to a particular cohort and is labeled by the

<sup>26</sup> Unlike Blundell and Preston (1998) we do not consider the behaviour of the covariance between consumption and income and test the over-identifying restrictions implied by the two alternative estimates of the variance of the permanent component of income.



cohort number. As before, the two panels refer to the household and per capita figures. Both graphs indicate a decrease in the variance of permanent income for most cohorts in 1992 and 1996. In 1994, the variance increases for some cohorts and decreases for others. The figures derived from household data are a bit more uniform than those derived from per capita data.

**Figure 21**  
**Changes in the variance of the transitory component of income**



In Figure 21 we plot the changes in the variance of the transitory component of income, as estimated by the differences between the changes in the variance of log income and the variance of log consumption. Once again, the left panel refers to the figures obtained with household income and consumption, while the right panel was constructed with per capita figures. As in Figure 20, we plot the changes in the variance against time for each of the cohorts in our sample. In 1989 and 1992 we observe a marked increase in the variance of transitory shocks. In 1994 the change in the variance is near zero for most cohorts. In 1996, instead, there is a further increase in the variance of the transitory

component of income for most cohorts. Therefore, the evidence in Figures 20 and 21 indicates that in 1996 the share of the variance of income changes due to transitory shocks increased substantially.

The analysis of the previous subsection indicated that there might be substantial differences in the dynamics of the cross sectional variance of consumption and income across education groups. For this reason, in Figures 22 *a* through *d* we present the evidence on the temporal changes in the variances of permanent and transitory components of income by education groups. Figure 22a indicates that for the group with the lowest education attainment the variance of permanent income is virtually unchanged. For the medium group, the same is true up to 1994. In 1996, however, the various cohorts fan out. For the figures obtained with total household consumption and income, most of them experience a decline, while for those based on per capita consumption and income, some experience a decline and some an increase in the variance of permanent income. Finally, for the group with the highest education attainment, the most evident feature that emerges from the picture is an increase in the variance of permanent income innovations in 1994 both, for household and per capita income.

Figures 22c and 22d plot the changes in the variance of the transitory component of income for our three education groups. The figures confirm what emerges from Figure 21, that is an increase in this variance in every year of those considered except 1994. There are however some substantial differences across education groups. The sizes of the changes seem to increase with education. Furthermore, there is much more heterogeneity across cohorts for the more educated group. This might partly be a reflection of the fact that, especially for the oldest cohorts, cell sizes for the high education group can be quite small, implying imprecise estimates.

To summarize the evidence presented in this section, we can say that:

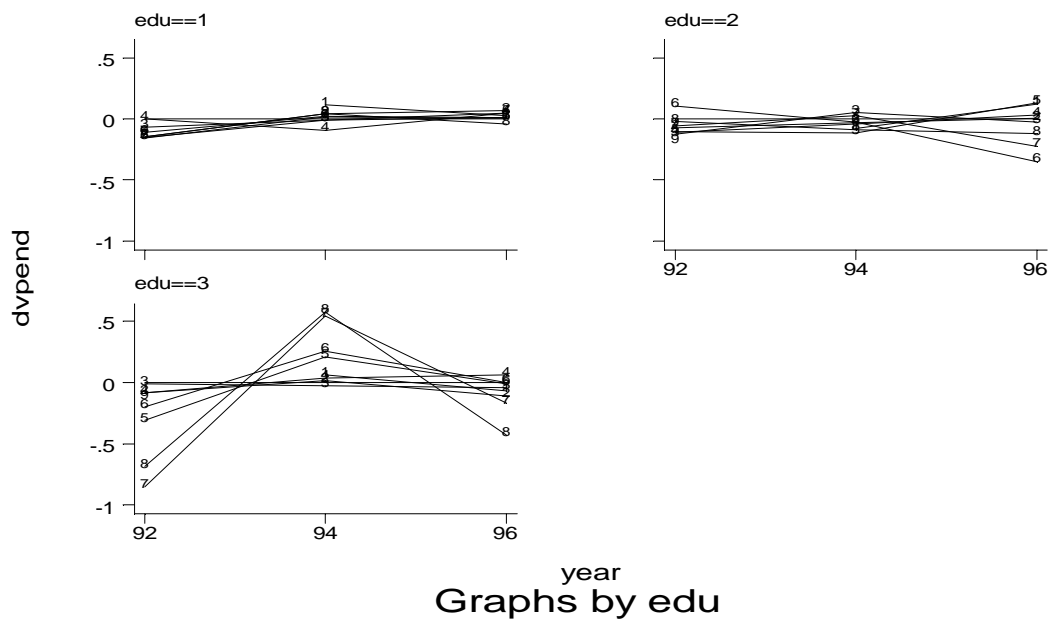
- a) unlike the evidence presented by Deaton and Paxson (1994) for other countries, the cohort variance of consumption (and income) does not seem to increase with age

when we divide the population into education groups. However, the patterns for the population as a whole are very similar.

- b) The variance of the permanent component of income has stayed roughly constant over the last 12 years. On the other hand, the variance of the transitory component of income has been increasing constantly, with the exception of 1994. This is evident both in the evidence for the whole sample and in that for education groups.

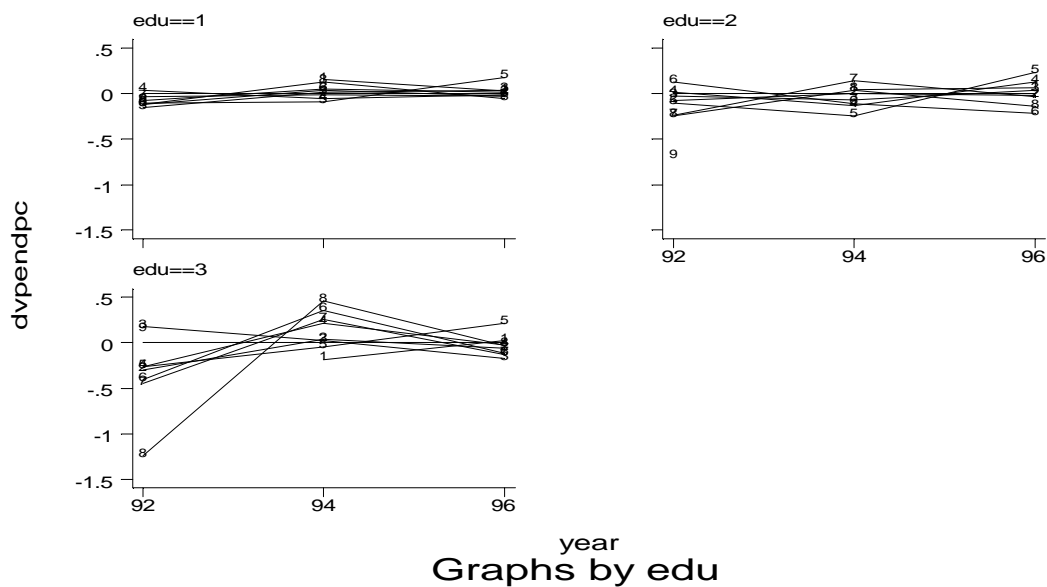
**Figure 22a**

increase in the variance of the permanent component of income  
panel 22a



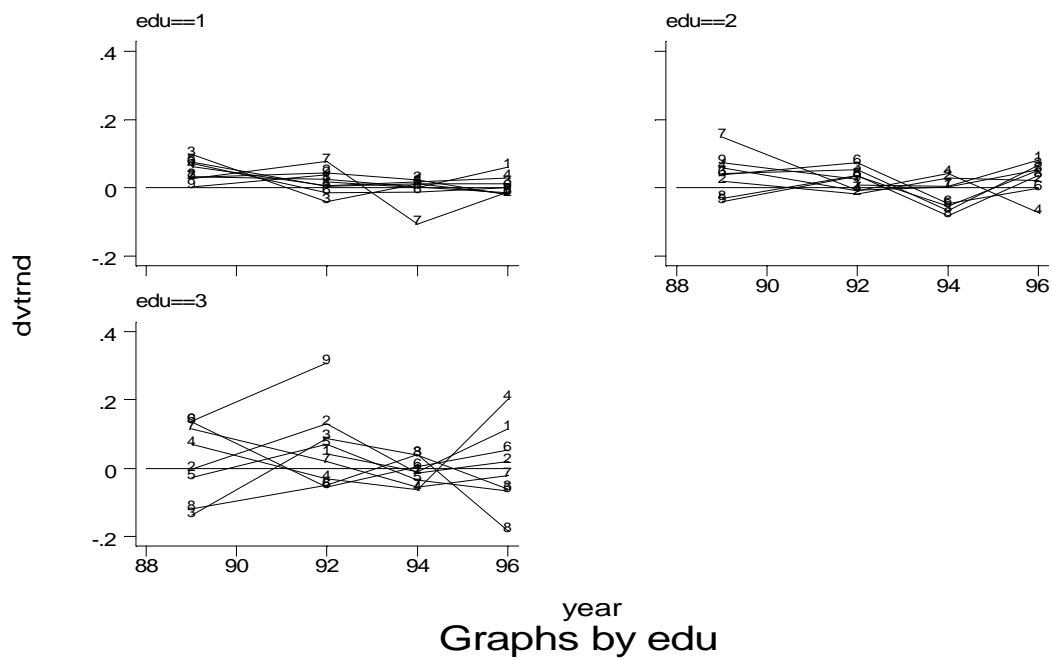
**Figure 22b**

increase in the var. of the permanent component of per cap income  
panel 22b



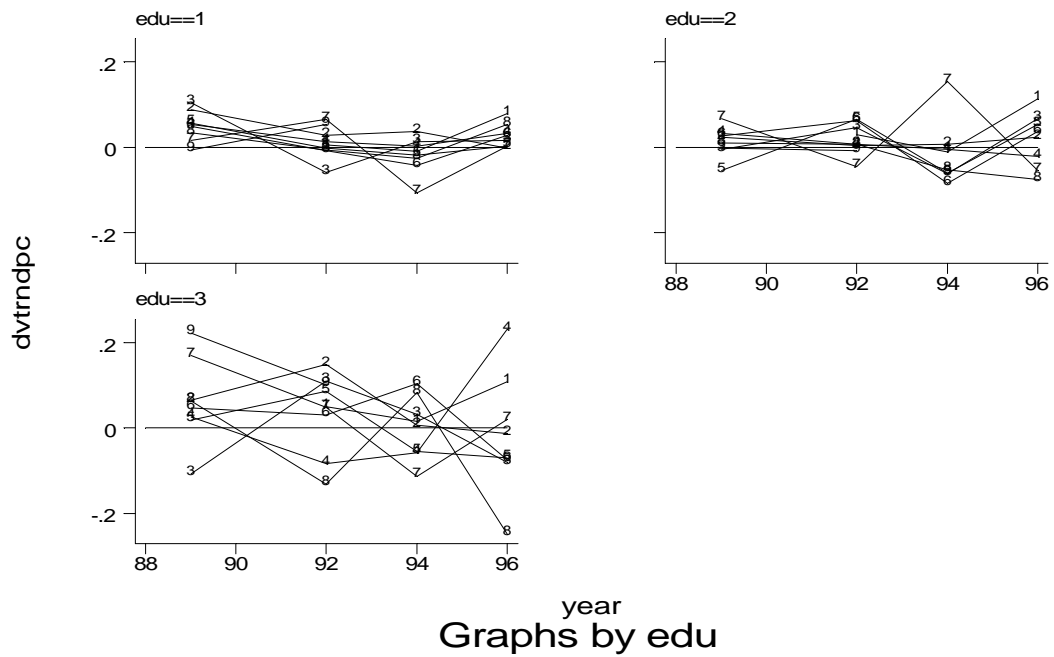
**Figure 22c**

increase in the variance of transitory component of income  
panel 22c



**Figure 22d**

increase in the var of transitory component of per cap income  
panel 22d



## 5. Conclusions

The objective of this paper has been to quantify household saving behavior in Mexico using microeconomic data. With regards to the level of saving, our analysis of five households surveys show that Mexican households have, on average, relatively high saving rates. Saving increased consistently between 1984 and 1994, while they declined significantly between 1994 and 1996.

We found that household saving is highly concentrated among households with the highest education levels (permanent incomes). The high concentration of saving has several implications. One of them is that the richest households are in a better situation to leave bequests to future generations (thereby reproducing the high inequality). They can save to smooth out reductions in income after retirement, and they are also in a better position to smooth out temporary shocks to their income. Additionally, better-off households also have better possibilities of improving their future income-earning capacity by accumulating assets through saving.

The low saving among the uneducated seems to be a long-term condition, perhaps due to their low income and mostly flat age-income profiles. Policies that try to increase household saving in Mexico should take into account that creating savings incentives for these sectors of the population is not easy. Most of the income-earners in these households work in the informal sector, where a reform to the pension system does not have a direct effect on saving. Indeed, the coverage of private (and public) pension arrangements should be a serious concern.

One interesting finding is that, apparently, the age-saving profiles for households with higher education seems to be more in line with what the life-cycle theory predicts, than the profiles for the groups with low or secondary education. Households whose head has higher education appear to dis-save more than the others to smooth consumption after retirement. However, this is not conclusive evidence, since our results might be affected by the presence of measurement error, especially when the number of observations for a specific group is small (which is the case for households with higher education). If the

behavior of the well-educated is in fact more in line with the life cycle model, a reform to the pension system could imply large advantages. Moreover, a large proportion of the income-earners belonging to these households work in the formal sector, where pension systems have their largest impact. It must be stressed, however, that only a small proportion of the population belongs to this group, while the vast majority presents a flatter age-saving profile. The majority of households have scarcer possibilities for saving during some stages of their life-cycle. In their case, it might be that strong family ties normally substitute for the lack of saving at the older ages.

Our results indicate that the increase in household saving between 1984 and 1996 can at least to some extent be regarded as a long-term change in saving behavior. This is not the case among the uneducated, but it is a feature of households whose head has secondary or higher education. In the case of uneducated household heads, the cohort effects are actually acting in the opposite direction as newer generations of this type have been saving less than previous ones for several decades. So, households with lower permanent incomes not only have the lowest saving rates, but they present a long-term tendency to save even less in the future. Policies aimed at promoting saving should therefore consider that in Mexico different sectors of the population may respond in totally different ways to saving incentives.

## Appendix

**Table A1**  
**National and Household Saving in Mexico**

Year	National Saving (% of GDP)					Household Saving**	
	Total Saving*	External*	Domestic*			from Surveys	
			Total Domestic*	Domestic Public*	Domestic Private*	(% of hh income)	
						S1	S2
1984	21.8	-3.0	24.7	7.9	16.9	8.5	12.4
1985	23.9	-0.9	24.7	6.8	18.0		
1986	21.2	1.5	19.6	3.9	15.8		
1987	21.4	-3.4	24.7	7.9	16.9		
1988	22.6	1.3	21.3	1.1	20.3		
1989	22.9	2.6	20.3	2.3	18.1	11.1	15.4
1990	23.1	2.8	20.3	6.7	13.6		
1991	23.3	4.7	18.7	7.9	10.8		
1992	23.3	6.7	16.6	6.4	10.2	12.0	16.3
1993	21.0	5.9	15.1	4.1	11.0		
1994	21.7	6.9	14.8	3.5	11.3	14.1	17.5
1995	19.8	0.5	19.3	4.3	15.0		
1996	23.3	0.5	22.7			9.5	13.7
1997	26.5	1.9	24.6				

\*Source: Banco de México. Proportions of GDP

\*\*Source: Author's calculations from household survey data. Proportions of total household income.

**Table A2**  
**Proportion of Household Heads in Each Education Group**

Education level	Proportion of Total Heads					Change			
	1984	1989	1992	1994	1994	1984-89	1989-92	1992-94	1994-96
No schooling	20.0	20.4	18.3	19.5	16.2	0.4	-2.2	1.2	-3.3
Primary incomplete	37.3	27.9	28.1	25.8	25.4	-9.4	0.2	-2.3	-0.4
Primary complete	18.5	18.5	19.0	18.6	18.8	0.1	0.5	-0.3	0.2
Secondary incomplete*	13.7	14.5	16.6	16.4	18.4	0.8	2.1	-0.2	2.0
Secondary complete*	9.2	15.4	15.9	16.3	16.7	6.2	0.5	0.4	0.4
Higher education	1.2	3.2	2.2	3.4	4.5	1.9	-1.0	1.3	1.1
Total	100	100	100	100	100				

Source: Author's calculations from the income and expenditure surveys.

\*Secondary education includes the 6 years of post-primary education.

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