Household saving in developing countries: Inequality, Demographics and all that.*
How different are Latin America and South East Asia?

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Note: This is an incomplete draft. Conclusions, References, an Appendix, as well as results for Peru and Taiwan are missing. They will be incorporated in a later draft.
Abstract: East Asia and Latin America have diverged in several dimensions in the past three decades. This paper compares household saving behavior in two countries in each region, using synthetic cohort techniques, to shed light over some of their differences. The counties analyzed are Mexico, Peru, Thailand and Taiwan. The paper has four contributions. First, to our knowledge, this is the first time that savings at the micro level for these two regions are compared. Second, we desegregate the population into education groups to determine whether there are differences in saving behavior along the distribution of income. Third, the evidence for Latin America provides insights about the evolution of savings and the capacity of different groups to smooth out shocks during crisis, which is of relevance for policies aimed at protecting vulnerable groups during crisis such as the recent years in East Asia. Fourth, we provide evidence about the usefulness of the life-cycle theory for explaining the facts, and present some forecasts that inform on whether future demographic changes will bridge or intensify the differences in household saving between these two regions.
1 Introduction

Due to the absence of efficient credit and insurance markets in developing countries, household savings are a crucial determinant of welfare. On the one hand, without savings, households have few other mechanisms to smooth out unexpected variations in their income, and so, shocks may leave permanent scars such as interrupting the process of human capital accumulation at early ages. On the other, since savings are one of the only means to accumulate assets in the absence of credit and insurance markets, the capacity to save becomes one of the main vehicles of social mobility and of enhancing future income-earning possibilities. Additionally, although there is controversy around the relation between savings and economic growth, it is generally agreed that once savings start to rise – perhaps due to increases in income – they enhance the potential to finance investment, and lead to the creation of more opportunities in the economy.

This paper uses micro data from household surveys to compare and try to understand saving behavior in two Latin American countries –Mexico and Peru- and two East Asian countries –Thailand and Taiwan-. These are among the only countries in each region with information on income and consumption at the household level for a series of years.

We intend to contribute to the literature on household saving behavior, in four ways. First, to our knowledge, this is the first time that savings at the micro level for these two regions are compared. The experiences of these regions have been remarkably different in many dimensions and we believe that the analysis could shed some light on why they have diverged. Analyzing household saving rather than aggregate saving –which have been compared in the literature- is useful because without the help of microeconomic data it is very difficult, if not impossible, to interpret the aggregate saving trends and discriminate among alternative models.

Second, rather than focusing only on total household saving as is common in the literature, we desegregate the population into education groups to determine whether there are differences in saving behavior along the distribution of income. This can provide useful
information for the design of policies aimed at promoting saving because it reveals if different sectors of the population have different saving motives, and different capacity to smooth out shocks and build up assets.

Third, the two Latin American countries we consider experienced economic shocks during the period under analysis, which are similar to those observed in the recent past in East Asia. Thus, the evidence may provide insights about the evolution of savings and the capacity of different groups of the population to smooth out the shocks, which may be of relevance for policies aimed protecting vulnerable groups in East Asia.

Fourth, micro data allows for testing different theories of household saving, and in particular, the relevance of the life cycle model. We provide evidence that helps to judge the usefulness of the theory for explaining the facts, and most importantly, we present some forecasts that give some idea of whether future demographic changes will bridge or intensify the differences in household saving between these two regions. It has been argued that East Asia benefited in the recent past from demographic shifts in which the relative size of the age groups that produce and save more has been increasing, and that this is one of the reasons why their economic performance and savings have been enhanced. Latin America is at the verge of experiencing similar –although somewhat smaller- demographic changes so it is of interest to verify the extent to which these shifts will contribute to increased savings in the region.

We do not examine savings behavior in isolation since it is affected by a number of household decisions. For instance, they are affected by demographic variables via family composition effects, so heterogeneity in this dimension is likely to be quite important. It is also very likely that saving behaviour is linked to labour supply decisions and in particular to labour force participation. Additionally, if different groups of the population, such as those endowed with different quantities of human capital, face different earning life cycle profiles, they will also have different incentives to save. It is therefore important, as we do below, to characterize the behavior of different groups of the population, such as those with different

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1 See Bloom, et.al. (1999) and Behrman, et.al. (1999).
education attainment, as well as characterizing changes in household composition and labor force participation over time.

An analysis of this type is not without limitations. First of all, both micro and macro data are affected by severe measurement problems. Not only they are measured with error, but also they often measure different concepts. Differences in the definition of consumption (in particular for items such as housing and health expenditure), in the population of reference (which is typically much smaller for survey data), in the treatment of income sources (especially for pension contributions, interest income and capital gains, imputed rents), all prevent a direct comparison between aggregate measures of saving rates and those derived from micro sources. Furthermore, in many developing countries national saving is not disaggregated in private and public, and, when available, private saving is not divided between households and corporate. On the other hand, in the few micro data sources available, data on asset ownership, entitlements to pension and so on, is of very limited scope and quality. Thus, matching aggregate private saving to micro data is not easy. Even if one thinks that households are the ultimate owners of corporations and assumes that they are able to ‘pierce the corporate veil’, aggregate private saving and micro data may differ if foreign investors own some firms.

In addition to these measurement problems, there are important conceptual problems. The main one is that some expenditure items, such as durables, housing, education, and health, have important saving components, but it is difficult to establish how large the saving components are. We will cut through these difficult issues making some strong assumptions and trying alternative definitions of consumption and saving. In the end, however, given the data available, some problems cannot be solved and one will have to keep in mind some important caveats in interpreting the results.

Another issue that needs to be borne in mind is that while saving is an intrinsically dynamic phenomenon, micro data, when available, do not typically follow the same individuals over time because they lack a genuine longitudinal dimension. To obviate this problem, we make an extensive use of the synthetic cohort techniques pioneered by Browning, Deaton and Irish (1985) and used, since then, in a variety of situations. The basic idea is to follow the average
behaviour of groups whose membership is assumed to be fixed over time. This procedure allows us to study the dynamic behaviour of the average of the variable of interest in different years. Even this technique, however, is not exempt from problems. The most important are the endogeneity of family formation and dissolution. We discuss these issues below.

Apart from this introduction, the paper includes six sections. Section 2 briefly reviews the evidence on aggregate total and domestic saving trends across regions and individual countries between 1960 and 1997, as well as the changes in demographics, schooling levels, and labor force participation that have taken place. The rest of the paper focuses on saving at the household level. Section 3, discusses the main methodological issues for the micro analysis as well as the databases for the empirical section. In Section 4 we report evidence on saving profiles by age, schooling and income at a single point in time to shed light over the nature of the differences in the most recent year available. Section 5 analyzes dynamic savings behavior. First we document the changes in household saving in the available years, and decompose the shift into an age profile, a demographic, and an income effect. We also identify cohort and age effects in the data, and complement this information with an analysis of cohort and age effects in fertility, female labor force participation, household structure, and the demographic structure of the countries. This dynamic analysis is the central part of the paper, as it sheds light over the reasons why East Asian and Latin American saving rates have been so different in the past few decades. The results are presented for the whole population and are further desegregated by classifying the population into education groups. Section 6 uses the micro data and demographic projections to forecast changes in household saving in the future, in order to verify whether the savings gap between the regions will tend to narrow or widen. Section 7 concludes.

2 Aggregate Saving Trends in East Asia and Latin America

It is well known that one of the main differences in the development experience of East Asia (EA) and Latin America (LA) is that EA has registered much higher savings rates for quite some time. Figure 2.1a in Figure 2.1 plots the patterns for national saving as a share of GDP for these two regions, based on data from the World Bank WDI (1999). In EA we include
only Korea, Singapore, Hong Kong and Thailand, which are some of the fastest growing economies with high saving rates (Taiwan is not included due to lack of data). The LA aggregate includes all the countries in the region for which information is available. Rather than presenting means by region, which are quite “noisy”, we present smoothed profiles obtained by regressing the saving rate on dummies by year and controlling for all country characteristics. According to the figure, national saving rates were already slightly higher in EA by 1970, but diverged quite dramatically since then. National saving rates increased in LA in the early 1970s and then collapsed in 1982 with the initiation of the debt crisis. There was a slight recovery in the second half of the 1980s, but the rate in EA increased continuously throughout the next 28 years. The gap between the regions by 1997 was of about 20 percentage points.

Figure 2.1b in Figure 2.1 plots the trends in domestic saving as a share of GDP smoothed out in the same way as Figure 2.1a. The story is similar, although the differences are even more apparent. The average domestic saving rate of the two regions was the same in 1965, but there is a continuously expanding gap since that year. Thirty-two years later, in 1997, the average domestic saving rate in LA was around 17% while the rate in EA reached almost 40%. So, most of the difference observed in the overall savings rates by region is attributed to the patterns in domestic saving.

Figure 2.2 presents the domestic saving rate for selected EA and LA countries. There are several interesting features from this graph. The most important from the perspective of this paper is that the four EA countries considered start out with domestic saving rates lower than the LA countries in 1960, but they experience a huge increase during the following 28 years. With the sole exception of Chile, there is not one LA country among those selected in the Figure that registers a saving rate significantly higher in 1997 than in 1960. Apart from Chile the only exceptions could be Mexico and Ecuador, but even in these cases the domestic saving rate increased by less than 10 percentage points, while the average raise in EA was of 30 points. Another feature is that the saving rate in LA is much more volatile than in EA. The four EA countries show a much smoother pattern and continuous increases throughout. In LA,

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2 Specifically, the graphs plot the coefficients for the year dummies that result from putting together two panels with a different mix of countries depending on the region, and then estimating fixed effects regressions on each panel. The dependent variable is the saving rate, and the independent variables are yearly dummies.
the saving rate changes quite dramatically from year to year in some countries (see for instance Peru, El Salvador and Nicaragua), and there is not one single case where there is a positive trend throughout the period. By 1997, all the EA countries in the figure have much higher saving rates than any of the selected LA countries.

The results in Figure 2.2 are specially important in light of the analysis with micro data in future sections, because they reveal that we will be comparing two countries (in LA) going through intensive crisis and volatility in saving rates, with other two (in EA) where domestic saving have increased continuously and smoothly throughout. Saving behavior in LA might be atypically erratic because of this.

At the same time that domestic saving patterns were diverging in EA and LA, there were also significant differences in other related dimensions. One of the most closely related to saving is fertility. The total fertility rates declined much faster in East Asia than in LA. Figure 2.1c presents the smoothed young dependency ratio between 1950 and 1997 and illustrates that by 1965 the demographic structure in the two regions was almost the same, but that after this year there is an expanding gap. Fertility in both regions started declining around the 1950s, but since the reduction was much faster and steeper in EA, by 1965 the cohorts entering working-age where much larger than the newborn ones. The implication for savings is that since 1965 a much larger share of the population was entering the ages characterized by higher saving rates and this composition effect might be an important force behind the differences in panels 2.1a and 2.1b.4

The reductions in fertility in the two regions are highly correlated with sharp increases in female labor force participation. Fertility and female labor force participation are usually jointly determined, and they have a double effect on savings behavior: lower fertility rates imply fewer children in the average household, while higher participation implies more household members in the work force and thus, more income. The result of both effects is higher household per capita income, and thus, higher saving capacity. Figure 2.1d illustrates that not only EA registered a much faster demographic transition, but also that the proportion of females in the labor force has been considerably higher. Female participation was already

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1 The source is also the WDI from the World Bank (1999).
lower in LA since 1960, and although the pace at which it has increased has been slightly faster than EA, the gap between the regions remains high.5

Another important transformation taking place in these two developing regions at the time when their saving patterns were diverging, is the schooling transition towards higher levels. Here also EA has had much faster progress than LA. Figure 2.1e plots the average years of schooling of the population over 25 years of age (taken from Barro and Lee (1994)), and illustrates how on average EA had .7 years of schooling more than LA around 1960, but the difference is more than 2.5 years in 1990. More educated individuals usually have higher incomes, and thus, higher savings capacity, so this is another of the potentially important factors behind the differences in domestic saving documented above.

Finally, as discussed in the introduction, it is not totally clear if economic growth precedes higher savings rates, or the other way around. Figure 2.1f shows that since the mid 1970s EA has had higher levels of GDP per capita (PPP adjusted), but that the differences in growth rates started becoming apparent since the mid 1960s, precisely when domestic saving rates surged (Figure 2.1b).

Regardless of the causality between savings and demographics, female participation, schooling progress and GDP growth, it is evident that EA and LA have diverged considerably in all these dimensions since around 1965. To explore these relationships further we rely on household survey data in what follows, but before doing so, we discuss some important methodological issues.

3 Methods and Data

The main purpose of the analysis in the following sections is to characterize the patterns of household saving over the life cycle. The conceptual framework on the background is the life-cycle model, even though we do not take a stance on the particular version (with precautionary saving, liquidity constraints, bequest motives) that might be most appropriate.

to describe the data. In addition to the description of life cycle profiles for savings for the population at large, we focus on the differences in behaviour among different groups of individual households. We also relate the observed saving behaviour to other variables, in particular demographic ones, which are likely to be important determinants of savings. This type of analysis is useful for several reasons. First, the focus on different groups of the population, characterized by differences in earning profiles, demographics and shocks received over the sample period, could be useful to shed light on the determinants of saving. We also stress the important differences across groups that get hidden by the aggregate analysis. This is particularly important for Latin America, which is characterized by a substantial amount of inequality. Second, the identification of age profiles for saving, if one gives them a semi-structural interpretation, allows the extrapolation of the relationship that links saving rates to demographic variables, and thus forecasts of future household saving rates.

The type of micro data available in different countries dictate the type of technique we use. Unfortunately, most Latin American countries with household surveys with information on both, income and consumption only have one or two data points available. Since we think that cohort effects are important, in the rest of the paper we perform a dynamic analysis focusing on the two Latin American countries (Mexico and Perú) and two South East Asian ones (Thailand and Taiwan) with information available to us for several points in time. As we will study a dynamic phenomenon and we use time series of cross sections, we are forced to use synthetic cohort techniques. These allow us to follow the same groups of individuals over time, even in the absence of a genuine longitudinal dimension in the data. Before moving to the analysis of the data we use, it is worth discussing some methodological issues.

3.1 Methods

The age profile of saving rates, consumption or any other variable in a single cross-section might not correspond, in the presence of strong cohort effects, to the age profile of any individual. To obviate to this problem we group the observations in each of several repeated cross sections according to one or more variables chosen so that the group membership from which the observations are drawn is likely to be fixed. In this way, instead of following the

5 The proportion of females in the total labor force is taken from the WDI, 1999.
behaviour of single individuals over time, one follows the average (or any other moment) of the variables of interest for the groups. In the context of a life cycle model, an obvious way to form groups is on the basis of the year of birth of the household head, so that we can follow the behaviour of different cohorts as they go through different phases of their life cycle. In what follows, however, in addition to year of birth cohorts, we also consider education groups, under the assumption that the accumulation of human capital can be done only in the early phases of the life cycle.

While synthetic cohorts are a powerful instrument, the technique is not exempt from problems, since group membership might be changing over time and family formation and dissolution could be endogenous to the phenomena under study. Differential mortality and migration can also induce changes in composition. Endogeneity of family formation and dissolution is relevant if the propensity to form a household at the beginning of the life cycle is different in different groups of the population and if family dissolution results in elderly individuals going to live with their offspring. Extended families and family arrangements in old age are particularly relevant for our analysis as they are directly related to life cycle saving and the incentives to it.

Most of the analysis we conduct will be graphical. In particular, with the purpose of identifying the life cycle profile of several variables of interest, we will plot the average cohort data for each cohort, against age. As different cohorts are observed over different parts of their life cycle we will be able to track the age profiles. Moreover, if the sample period covered by the time series of cross section is longer than the interval used to define a cohort, we will observe different cohorts at the same age, although, obviously, at different points in time.

The discussion in the previous paragraph makes it apparent that the methods we use could be used to identify both age and cohort effects. An important caveat should, however, be kept in mind. While it is true that with a long enough sample period, one observes different cohorts at the same age, one should resist the temptation to always interpret the resulting differences as due purely to cohort effects. The obvious reason is the possible presence of year effects. In general, while we use smoothing techniques to present age and cohort effect, strictly
Speaking, age and cohort effects can never be disentangled without additional information or restrictions from time effects, because of the exact linear relationship linking age, time and year of birth. While in some cases, such as demographic variables, it is natural to impose the absence of year effects, in other cases this assumption is a strong one and the results should be taken with caution. One should always remember that any combination of cohort and age effects can be obtained as a combination of age and time or time and cohort effects.

Once we estimate the age effects for saving rates in Section 6, we extrapolate them to forecast future aggregate saving rates. In particular, we use the following relationship. If we indicate with \( S_{ag}^{\text{ag}} \) and \( Y_{ag}^{\text{ag}} \) the aggregate saving and income time \( t \), and with \( S_{c}^{c}, Y_{c}^{c} \) and \( N_{c}^{c} \) the saving, income and size of group \( c \) (cohort) at time \( t \), the aggregate saving rate will be given by the following expression.

\[
(1) \quad S_{ag}^{\text{ag}} = \frac{S_{ag}^{\text{ag}}}{Y_{ag}^{\text{ag}}} = \frac{\sum_{c} S_{c}^{c} N_{c}^{c}}{\sum_{c} Y_{c}^{c} N_{c}^{c}} = \sum_{c} \frac{S_{c}^{c}}{Y_{c}^{c}} \cdot \frac{N_{c}^{c}}{\sum_{c} Y_{c}^{c} N_{c}^{c}}.
\]

where \( \frac{N_{c}^{c}}{\sum_{c} Y_{c}^{c} N_{c}^{c}} \). If one assumes that group saving rates are a function of age and cohort effects, one can project in the future the group saving rates \( \frac{S_{c}^{c}}{Y_{c}^{c}} \) estimated in the micro data with equation (1), relative income profiles and available demographic projections to forecast future saving rates. These forecasts should be treated with extreme caution. They are based on the behaviour generated in a given economic environment (that is by household facing given earning and demographic profiles, and a given set of institutions, including arrangements for old age). Moreover, the data problems mentioned above make the matching between the micro and macro measures of saving very hard. Nonetheless, these forecasts are informative about the potential effects of demographic trends and changes in the composition of the population on aggregate saving.

If the groups are defined not only on the basis of the year of birth of the household head, but also on education achievement, forecasting using the aggregate saving rate in equation (1) becomes even harder. This is because it involves forecasting not only the age structure of the
population (for which demographic projections can be used), but also the accumulation of human capital. General equilibrium effects and in particular the effect that the relative size of different skill groups might have on the returns on human capital complicate this type of exercise even further. Notice that, in the absence of cohort effects, one can in principle use the age profile from a single cross sections to perform the same exercise. Additional caution, however, is needed when interpreting such an exercise.

Even if one does not want to disentangle age and cohort effects and considers equation (1) at two points in time, one can use it to decompose the changes in aggregate saving rates in changes due to shifts in the cross sectional age profile and changes in the weights:

\[
{s_r^{ag}}_{t} - {s_r^{ag}}_{t-1} = \sum_{c} s_{t}^{c} (w_{t}^{c} - w_{t-1}^{c}) - \sum_{c} w_{t}^{c} (s_{t}^{c} - s_{t-1}^{c})
\]

Changes in weights can be in turn be decomposed in changes in the relative sizes of different age groups and changes in their disposable income. We perform this accounting decomposition in Section 5.

3.2 Data and definitions

Good quality micro data including information on income and consumption (and possibly wealth) are few, and when available for a country, they tend to be far apart in time. This is true both in developed and developing countries. For Mexico, Peru, Thailand and Taiwan cross sectional data observed at several points in time, is available to us. For Mexico we have data from 5 surveys, collected in 1984, 1989, 1992, 1994 and 1996. The last year of data is of particular interest because it refers to the year just after the Peso crisis. The data from Peru refer to the years 1985, 1991, 1994 and 1997. Again, in the case of Peru, two surveys surround the 1990 crisis that affected the Peruvian economy in a very severe fashion. The data from Thailand is from The Socio-Economic Survey (SES) and refer to 8 years, 1975, 1981, 1986, 1988, 1990, 1992, 1994 and 1996. Finally the data from Taiwan, are annual data from 1976 to 1996. For all these data we are able to construct measures of disposable income, consumption, family composition, education attainment of the household head, and labour
supply. Details on these surveys are available in the data Appendix. Here we simply list some of the definitions that are relevant for the analysis of saving.

1) In all four cases, income is defined as household disposable income. This includes earnings, transfers, capital income, and also non-monetary income.

2) We use four definitions of consumption to calculate savings rates (s): the first includes all household expenditure and is the closest to the definition typically used in National Account data (we call this $s_1$). With the second definition we try to take into account the fact that some expenditure items have an important saving component. Therefore, we exclude from consumption all expenditures on durable goods (including housing), health, and education (labeled $s_2$). While far from perfect, as, for example, it does not include the services accrued from durable goods or the rental value of owned housing, the analysis of this alternative definition of consumption and saving deserves attention. The third definition excludes only expenditures on durable goods, but considers health and education as current consumption, rather than as savings ($s_3$). Finally, a measure we label $s_4$ includes durable and non-durable expenditures in the definition of consumption but excludes health and education, which are considered as savings in this case.

3) All surveys include some definition of human capital. We divide the population into three groups, primary education or less, some secondary schooling, and higher education. Different institutional factors across countries are taken into account for this classification.

4) Household arrangements are somewhat different across countries. While we present some evidence on this and we document the extent of possible problems with endogenous family formation and dissolution, in the end we use the standard definition of declared household head across countries.

Throughout the analysis we divide the samples in year of birth cohorts. To be able to work with cells of reasonable size we use a five-year definition. The cohort definition is homogeneous across countries and is given by Table 3.1. In the table, in addition to the definition of each cohort, we report the average cell size for each of the sets of surveys used in the dynamic analysis. Interestingly the smaller samples are observed in the countries with the largest populations. For instance, Mexico’s population is larger by around 40 million
individuals than the population in Thailand, and still the Thai data has 60% more observations than the Mexican. The differences are larger at older ages. Thus, any estimate derived for Thailand will have a higher degree of precision especially for the older cohorts, while the Mexican will be noisier. For Mexico we use population weights to compute the means plotted in the figures, but we do not have them for Thailand for all years, so they are omitted for this country.

4 Static analysis for the most recent data

The data on aggregate private savings rates presented in Figure 2.2 are far from perfect for many reasons. One of the main ones is that savings in the National Accounts are calculated as residuals of other aggregates that are also measured with some error. In this section, we first complement the aggregate evidence by presenting household saving rates calculated from the micro data for the most recent year available in each of the 4 countries. Since we have access to the micro data, we also characterize saving for different population subgroups and ask if the differences in savings rates across EA and LA are due to the demographic differences illustrated in Figure 2.1. We leave to section 5 the dynamic analysis.

4.1 Differences in Savings, Demographics, Participation and Schooling

To make the link between the aggregates presented in Section 2 and the results from the micro data, we concentrate on the most standard definition of savings, which corresponds to total disposable income minus total expenditures, divided over total disposable income \( s_1 \). We calculate it with the aggregates from the survey rather than averaging out every observation. Table 4.1 presents \( S_1 \) for Mexico and Thailand, along with the aggregate private saving rates from the WDI (1999) for 1996 (plotted in Figure 2.1). The difference in aggregate private savings between the two countries is of about 10 percentage points, while household savings computed from the micro data show a much larger difference of around 20 points. So, the micro data reinforces the fact that Thailand has much higher private saving rates than Mexico, and it seems that an important source of the difference is originated at the household level.
The table also includes the young dependency and female labor force participation rates. As expected, dependency ratios are higher in Mexico (by about 10 points), reflecting that this country is at an earlier stage of the demographic transition, while female participation is much higher in Thailand. These results are not too surprising if, as already mentioned, lower dependency and higher participation are associated with higher savings capacity. However, when we turn to the average years of schooling of the working age population and to GDP per capita, we find that Mexico has higher values of both (which are typically associated with higher saving), but still has much lower savings.

One possible explanation for the differences between aggregate household saving rates in Thailand and Mexico might be that Thailand is at a later stage of the demographic transition and has larger shares of its population in ages where saving rates typically peak. Table 4.2 plots the saving rate for 5-year age groups, as well as the population share for each group for the two countries. The total saving rate obtained as a (population) weighted sum of age-specific rates is also presented. The most interesting feature is that for all ages the saving rate in Thailand is higher. The population weight of the older age groups is also greater, as expected. As a gross approximation to assess the role of demographics in these differences, we recompute the saving rate in Mexico using Thai population weights, and vice versa, and present the results in the last two lines. Although the rate for Mexico increases and declines for Thailand, the difference with the original saving rate in each country is only marginal. This suggests that having larger shares of population in age-groups that save more do not account for the major differences in saving behavior between these two countries.

In Table 4.3 we report saving rates by education groups. In this case also, we observe that Thailand has much higher rates, and interestingly, the largest differences are among the most educated households (a difference of 28 points, as compared to 22 points for the least educated). The table also presents the population weights as well as the weighted average of the saving rates in each group. Clearly, the differences in total household savings rates are not given by the size of the education groups, but by the differences in the rates. The simple accounting exercise at the bottom of the table, where we recomputed the Mexican average using Thai weights, and vice-versa, confirms this.
To look at differences along the income distribution, Table 4.4 presents income quintile-specific saving rates. In this case also, it is clear that the most apparent difference between these two countries lies in the fact that the rates in Thailand are considerably higher along most of the income distribution. They are already positive in the second quintile, but the gap between the countries is greatest among the top 20%. Surprisingly, the only group where Mexico presents higher (less negative) savings rates is in the poorest 20% of the population. This might be an indication of the importance of transitory income components in the two countries, or of larger measurement error that characterizes the lowest incomes. A large part of the difference between the aggregate saving rate in these two countries is explained by the extremely high rates among the population in quintile 4, and especially among the households in the richest quintiles. The last column of the table presents the Gini coefficient for household per capita income for both countries, and confirms that inequality is somewhat higher in Thailand, but still the differences in savings are much larger.

So, differences in the relative importance of different age and education groups do not account for the large disparities in household savings across these two countries, while differences in income distribution may be an important part of the story. Another explanation may be that, as illustrated in Section 2, Mexico has experienced severe economic crisis, precisely during the 1984-1996 period considered for this country, while economic indicators in Thailand seem to have progressed much more smoothly. Thus, an important reason why Thailand has such higher rates might be that households in Mexico have been exposed to an economic environment characterized by the use, rather than accumulation of savings. We look into this in more detail in the following section.

5 A dynamic analysis of household saving in Mexico, Perú, Thailand and Taiwan.

Table 5.1 presents the evolution of the four definitions of household saving, for Mexico and Thailand. In Mexico, \( s_1 \) increased between 1984 and 1989, which were characterized by

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\(^6\) The estimates for 1984, 1989 and 1992 for Mexico do not coincide exactly with the estimates of \( S_1 \) and \( S_3 \) reported in Table 1 in Székely (1998) although they are produced with the same data. The difference is that Székely 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
stagnation and the partial recovery of growth after a substantial drop in 1986. The 1989-1994 period was characterized by a consumption boom and an increase of 3 percentage points in the saving rate. The trend followed by $s_3$ is similar, although the increase between 1989 and 1994 is somewhat smaller. This reveals that the consumption of durable goods was increasing, although not as much as non-durable consumption. The median savings rate, presented also in the Figure, shows a slightly different pattern. They increase much less between 1984 and 1989 and drop in 1992 rather than increasing continuously between 1989 and 1994. The decline between 1994 and 1996 is also sharper. Thus, the savings rates for the poorest 50% of the population have been less responsive to the increase in income after 1989, and rather, the income gains seem to have translated in greater consumption of both, durable and non-durable goods. The 1994 tequila crisis had a larger negative effect on the savings of the poorest 50% than over the rest of the population, perhaps because of the limited alternative sources of income smoothing mechanisms for this group.

The picture for Thailand is quite different. For instance, if we compare the pattern between 1986 and 1998, which is similar to the period covered in Mexico, we find that, with the exception of a drop in 1988, household savings have increased rather smoothly. They peak in the last year at 33%, 62.3%, 56.9% and 38.8% for each of the definitions, respectively. In contrast to Mexico, the 1990s have been a decade of considerable increase in household savings, but interestingly, the median savings rates reveal that the increases at the lower 50% of the distribution have been very similar, and even larger for some definitions, as for the rest of the population.

The last two columns of Table 5.1 present the domestic saving rate as a share of GDP, and use the volume of household savings from the surveys to estimate the relative importance of household savings at the national level. Specifically, we take the annualized value of $S_1$ (before dividing it over total income) and divided it over GDP. This is only a gross approximation because household surveys normally suffer from income miss reporting or under reporting, so we are not sure that this data reflects the total volume of household savings with precision. Furthermore, the calculation does not account for the savings that

\[ \text{in the case of } S_3, \text{ than those reported in Table 1 in Székely (1998). However, all estimates for Mexico are compatible with the ones in Attanasio and Székely (1998).} \]
households have in firms, the value of pensions, and other important items.\textsuperscript{7} In any case, the results are useful for identifying differences across countries. Interestingly, although household savings are lower in Mexico, they represent a larger share of GDP in this country. In 1994 they account up to 6.5%, but then drop to 3.5% in 1996. In Thailand, the highest rate is observed in 1996 also, but in this case it amounts to only 1.7%. In the rest of the years it fluctuates around 1%.

Table 5.2 uses the decomposition in equation (2) in Section 3 do decompose the changes documented previously, into three effects. The first is an age profile effect, which accounts for the increase in savings that is due to the fact that cohorts age through their life cycle and save more or less depending on their needs and future prospects. The second is a demographic effect that measures the change in savings due to the fact that the population weight of different age groups shifts. The third is an income effect that accounts for the fact that as individuals age, their income tends to raise, and thus, they have greater savings capacity.

The table only presents the decomposition for the first and last year available for each country and shows stark contrast between Mexico and Thailand. In Mexico, the increase between 1984 and 1996 is small (of 1 point), and all the shift is driven by the age profile effect of cohorts moving along the life cycle. The demographic effect, which is actually negative due to the increase in the relative weight of young age groups, cancels out with the positive, but weak, income effect. The story for Thailand is quite different. Savings rates increase by 19.5 points in this country. About half of the increase is an age profile effect, 4.6 points are due to the increase in relative weight of the population groups that save more, while 5.8 points are due to a positive income effect. These results support the argument that an important reason why savings have surged in EA, is because of the demographic conditions of these countries. In Thailand, they account for almost 25% of the rise.

It must be borne in mind that the time span for the comparison in Table 5.2 for Thailand is larger, and most importantly, that the period under analysis in Mexico is characterized by economic instability and low economic growth. So, a large part of the difference may be

\textsuperscript{7} For a more detailed assessment of the extent to which income is under reported in the LA surveys, see Székely
reflecting that the economic environment in Thailand has been much more favorable for building up savings than in Mexico. Now we turn to examine these shifts in more detail.

5.1 Mexico

As mentioned above, we divide each survey into 12 birth cohorts and three education groups. We start the analysis by looking at the issue of family formation. For this reason, the first graph we present, rather than being based on household data, is based on individual data. In particular, in the four panels of Figure 5.1.1, we plot the average age of the head of the household where an individual lives against the age of the individual. To produce this graph, therefore, we use all individuals in the sample, regardless of their position within the household. The top left panel of this and the following figures refers to the whole sample, while the remaining three panels refer to the three education groups considered (from low to high). Each connected segment in this figure tracks the average of the variable of interest for a cohort of individuals as they age over time.

If all individuals in a given cohort were household heads (or living in a household with a head of the same age), the 45 degrees line would coincide with the cohort profile of the average household age. In the figure, the cohort profiles diverge from the 45-degree line at the beginning and at the end of the life cycle. Naturally, headship rates are quite low at the beginning of the life cycle, so that the cohort profile lies above the 45-degree line, indicating that some young adults are still living with their parents. The speed with which the profile gets close to the 45-degree line is an indication of how early new families are formed. Toward the last stages of the life cycle headship rates decline and they fall below the 45-degree line, because the elderly merge into other households where the head is younger. These differences along the life cycle are correlated with education levels. For instance, among the uneducated this pattern is much more pronounced, and the elderly tend to have smaller headship rates, perhaps reflecting that their low incomes make life in single family units unfeasible. In contrast, the most educated have much higher headship rates and continue to be heads of households even at older ages. This suggests that the family plays an important

and Hilgert (1999).
role for smoothing consumption for the elderly, especially among those with lower income-
earning capacity.

The results in figure 5.1.1 are also interesting from the methodological stand point, because
they show that family composition changes in important ways along the life cycle, especially
among the uneducated. This means that even though we are tracing the same type of
household in the repeated cross sections available, the composition of the group is changing,
and blurring our impression about the behavior of cohorts as they age.

Figure 5.1.2 plots the average years of education of household heads, as well as the
proportion of household heads with secondary and higher education, respectively. Since after
26 years of age only few individuals continue to acquire formal education, we plot the
cohorts from this age on. If there were no composition effects in the 5 cross sections under
analysis there would be differences in level across cohorts, but the age pattern of each would
be close to a horizontal line. In the figure, the first element worth noticing is the size of the
cohort effects, which is a good measure of the process of human capital accumulation. The
second thing to notice is the presence of some compositional changes in the surveys. While
some of this could be attributed to sampling error, systematic positive trends in the years of
education and/or in the proportion of well-educated individuals could be a symptom of
differential mortality effects. While these effects are there, they are not particularly strong or
significant.

In Figure 5.1.3, we start using household data. In particular we consider the evolution of
family size. In the four panels of the picture we plot, for the whole population and the three
education groups, the log of family size against the age of the household head. Two features
deserve to be stressed. First, there are large differences in family size among education
groups, with the least educated having the largest families. Second, there are large cohort
effects, with the youngest cohorts having much smaller family size. These effects are
particularly strong for the most educated. The pattern is mirrored in Figure 5.1.4 where we
plot the average number of children against the age of the household head. Notice that both in
this and in the previous figure it is not implausible to interpret the differences between
different cohorts as pure cohort effects. That is, in the case of family composition, it plausible to rule out the existence of systematic year effects. \(^8\)

In Figure 5.1.5 we plot the average of the log of disposable family income and the log of consumption. These pictures are by now familiar. Both consumption and income are hump-shaped and present marked differences across education groups. In particular, notice that the ‘hump’ is much more pronounced for the better-educated households and that there are large differences in the level of income and consumption across education groups. The hump-shape of these profiles has been much debated and has been interpreted as evidence against a simple version of the life cycle model. Here we only notice that family size and number of children present similar differences across education groups and that if we ‘correct’ the consumption profiles for differences in family size, the hump all but disappears. This is evident in Figure 5.1.6, where we plot the log of per capita total and non-durable consumption. Notice how the crisis of 1995 is much evident both in the family and per capita data for income and consumption.

In Figure 5.1.7, we plot two definitions of saving rates. The first includes all expenditure items \((s_1)\), while the second excludes durable goods, education and health expenditure \((s_3)\). Notice that the shape of the profiles is roughly similar, regardless of the particular definition one uses. More importantly, the better-educated households, who face a hump-shaped income profile, do most of the saving. This feature is consistent with the life-cycle model.

Before moving on to smooth the profiles, we present some evidence on a number of variables that, in addition to the demographic and income variables we have considered so far, are likely to be important determinants of savings (or at least determined together with it). In particular, we consider the pattern of wages and labour supply behaviour over the life cycle. In Figure 5.1.8, we plot male wages. The evidence from this picture is not particularly surprising. First, the profile for better-educated individuals is not only higher but also much steeper. These two facts imply that most of the saving should be concentrated into this group, both because they have the ability of generating a higher level of saving and because they

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\(^8\) Sampling error, induced by small cell sizes, could be interpreted as a time effect. However, it is plausible to assume that this has zero mean and does not exhibit any time trend.
have stronger incentives for life cycle smoothing. Second, for all groups the effects of the 1995 crisis are quite apparent.

In Figure 5.1.9 we plot male and female labor force participation rates. The evidence that emerges from this picture is of strong differences between males (the curve above) and females (the curve below), especially for the groups with lower education. Relatively large cohort effects, however, are visible in the labour force participation of the females in the lowest educated households. As far as the male data are concerned, it seems that retirement is much more synchronized for the better-educated males and, on the contrary, is much more gradual for the group with the lowest education level. This phenomenon might be related to the fact that better-educated individuals are more likely to participate into the formal sector and are therefore covered by social security arrangements. Higher labor force participation rates enhance savings capacity, so these results are compatible with the apparent cohort effects in saving presented previously.

Figure 5.1.10 smoothes the saving profiles presented in Figure 5.1.7. This is done by regressing the data points plotted in the Figure on a polynomial in age, a set of cohort dummies and some year dummies constrained to have zero mean and to be orthogonal to a time trend. We plot the polynomial for an arbitrary cohort in the figure. Under these assumptions, the evidence one gets from the smoothed profiles confirms our expectations. In particular, the profile for the less educated individuals is very flat. For the best-educated individuals, instead, the profile increases monotonically with age. Only the middle group presents something similar to the hump-shaped profile implied by the model. Even for this group, however, the decline starts only after age 65 and is very gentle.

In Figure 5.1.11, we plot the cohort dummies obtained from the same regression. Obviously the assumptions made here are very strong. In addition to the restrictions imposed on the year effect to achieve identification, we assume that the shape of the age profile is similar across cohorts and that cohort effects only shift the intercept of such a profile. The cohort effects indicate the presence of substantial differences across cohorts. In particular, the youngest

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9 As discussed above, one cannot separately identify time, age and cohort effects. The restriction we impose on the data is equivalent to assuming that all the deterministic trends in the saving rate data originate from a combination of cohort and age effects. On this issue see the discussions in Heckman and Robb (1987), MaCurdy
cohorts (those with the lower cohort number) seem to have somewhat higher saving rates in the population at large. But these effects are not found for all education groups. Cohort effects are only positive for the middle group and the most educated, with much stronger effects for the latter. For the uneducated, younger cohorts are saving less than their predecessors.

Figure 5.1.12 plots the restricted year effects estimated together with the age profile plotted in Figure 5.1.10 and the cohort effects plotted in 5.1.11. The large negative shock for 1996 is evident for all education groups. For the highest education group, the 1996 shock is very large and negative, while the effects in previous years are all mildly positive (or very small and negative, as for the 1984). For the lowest education group the aggregate shock is negative in 1992, and the positive time effects in the years prior to 1996 are smaller than for the rest of the population. The 1996 effect is similar for all groups.

The age and cohort profiles estimated so far depend on the arbitrary normalization that year effects sum up to zero and are orthogonal to a linear trend. This assumption interprets all trends in the data as a combination of age and cohort effects. If we assume that there are no cohort effects in saving rates, maybe because cohort effects in income and saving cancel out perfectly, as suggested by Deaton and Paxson (1994a), we can identify unrestricted year effects. Moreover, the estimated shape of the age profiles changes. These age profiles are plotted in Figure 5.1.13, using the first year of the sample as intercept. For the whole sample, the effect of assuming no cohort effects is to increase the size of the hump. Saving rates start rising around age 40 and peak just after 60. This pattern is roughly consistent with the life cycle model. For the lowest education group the effect is roughly similar. A profile that looked basically flat now shows a modest hump with a peak just past 60. While the middle education group is almost unaffected, the largest effect is for the high education group. The assumption of no cohort effects implies a hump shaped profile with a dramatic decrease after age 65, while the previous profile was monotonically increasing in age.

The unrestricted time effects in Figure 5.1.14 are also different. Clearly, the strongest negative effect for 1996 is observed among the least-educated household heads. Time effects

are also negative in 1996 for the intermediate group, and surprisingly, the most educated show a positive time effect for this same year. This might be indication of their greater capacity to smooth out shocks.

5.2 Perú

This subsection is missing in the current draft

5.3 Thailand

In this section, we report results for Thailand similar to those presented for Mexico. As for Mexico, we start with some cohort graphs based on individuals, rather than households. In particular, in Figure 5.3.1, we plot the average age of the head of the household where an individual lives. The general pattern that emerges from the picture is remarkably similar to that observed in Mexico. Headship rates are low at young and older ages, and vary considerably by education level. The relatively uneducated tend to merge into other households at older ages, while the most educated continue to be household heads. So, biases due to family formation and dissolution during the 1975-1996 period under analysis will be larger among the uneducated.

As for the patterns of human capital stocks after age 26, Figure 5.3.2 shows practically horizontal lines for all cohorts, especially for average years of schooling and for secondary schooling. Maybe because of the larger sample size, the Thai samples do not show the noise and sampling variation evident in the Mexican data. Differential mortality effects are not particularly apparent either. Average years of schooling and the proportion of household heads with secondary and higher education appear to be much higher for Thailand. Moreover, if one interprets the vertical difference among cohorts as measuring the speed of capital accumulation, we notice that this process has accelerated considerably in Thailand, something we did not observe in Mexico. For the last few cohorts, the differences is above one year of education (each cohort is defined over a five year interval).

In Figure 5.3.3, we plot the log of family size. This picture contrasts very sharply with the one presented for Mexico. First, notice that family size is much smaller in Thailand than in Mexico. As in Mexico, households headed by individuals with low education are generally
larger. However, the absolute size is smaller and the cohort effects for the youngest cohorts are larger in Thailand than in Mexico. Furthermore, in Thailand, family size does not decline in the last part of the life cycle at the same speed as in Mexico. This might be a consequence of children leaving home much later and/or of older adults joining what becomes an extended family.

A similar story is told by Figure 5.3.4, where we plot the average number of children in the household. This is much lower in Thailand than in Mexico. Moreover, the cohort effects, although strong in Mexico, are much more visible and important in Thailand. Notice how the maximum number of children is reached at around age 43 and that for the most recent cohorts the peak is at less then 2 children.

Figure 5.3.5 plots the age profiles for log income and consumption. Several interesting features emerge from this picture. First, unlike in other countries, we do not see a very marked hump shaped profile, in either income or consumption. Second, we notice that both income and consumption profiles are much steeper for better educated individuals. Third, there are sizeable differences among cohorts observed at the same age. However, most of these differences appear in the last years of the survey, so they could be interpreted as a common time effect. Finally, the consumption and income profiles diverge considerably for the better-educated households in the second part of the life cycle. This will have obvious implications for saving profiles.

In Figure 5.3.6 we plot the income and consumption profiles in per capita terms. The same considerations made for Figure 5.3.5 apply for the total population and the group of the less educated individuals. All cohorts seem to be increasing over time, especially in the last few years of the sample. The profiles for the last two groups of education (2 and 3) instead, are considerably flatter.

In Figure 5.3.7 we plot $s_1$ and $s_2$. For the total sample and for the first two education groups there is no evidence of a decline in saving rates in the last part of the life cycle. The profiles for the first education group are very flat, while for the second are increasing over time.
Those for the best-educated individuals are much noisier and, while increasing for most of the life cycle, they might suggest a flattening out in the last part of it.

In Thailand we cannot compute individual wages, so that we do not have a figure corresponding to Figure 5.1.8. In Figure 5.3.9, instead, we plot labour force participation rates for males and females. Those for males are quite similar to those observed in Mexico, in that the profiles for the better-educated individuals drop much more sharply than those for the males with low education, whose decline after age 60 is much more smooth. Female labor force participation rates are much higher in Thailand than in Mexico, and stronger cohort effects are apparent for the best-educated individuals.

Figure 5.3.10 plots the smoothed age profile for saving obtained following a procedure identical to that used to get Figure 5.1.10 for Mexico. The smoothed age profiles confirm what was apparent already in the un-smoothed picture (fig. 5.1.7). In particular, the age profile of the least educated is flatter than that of the other two groups. For all groups there is a tendency for the saving profile to increase in the last part of the life cycle, and there is no evidence of a decline, as the theory would suggest. Figure 5.3.11 plots the cohort effects. It should be remembered that these, like the age effects, were obtained under the arbitrary assumption of zero mean, no trend year effects. There are strong positive cohort effects in saving for all groups, although much more mild for low education groups.

We plot the ‘constrained’ year effects in Figure 5.3.12. They indicate extreme fluctuations in the last two years of the sample, especially for the lowest educated and for the whole sample. Our results on age and cohort effects in Thailand differ from those reported by Paxson (1994). In particular, Paxson, who only considers the whole population and does not look at education groups, finds an age profile for saving rates that is very flat over the life cycle. While we use slightly different selection criteria, the main difference seems to be due to the fact that Paxson does not use the data from 1994 and 1996. When we drop those years, we obtain results that are much more similar to what she gets. The reason is that in the last two years saving rates increase for all cohorts considerably. Our smoothing procedure forces to interpret these trends as either age or cohort effects, as time effects are assumed to be

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10 Also, unlike Paxson, in this draft we do not use expansion factors for difficulties with computing them in most
orthogonal to a time trend. This gives us the raising age profiles for the whole population and for each of the education groups and should remind us of the interpretative caveats already discussed in Section 3. Interestingly, our results for Thailand are similar to those that Paxson reports for Taiwan. We come back to possible interpretations of these results below.

As with Mexico, we also investigate the alternative identification strategy of assuming no cohort effects and letting unrestriciting year effects. This is done in Figure 5.3.13 and 5.3.14. As with Mexico, the largest difference in age profiles is found for the highest education group. Once again, a monotonic saving-age profile changes in a pronounced hump shape. Surprisingly, for the middle education group there is no substantial difference. For the whole sample and for the lowest education group, a gentle hump-shape is now evident. The time effects in Figure 5.3.14, as expected, trend upwards in all cases.

5.4 Taiwan

This subsection is missing in the current draft

5.5 A comparison of saving profiles in South East Asia and Latin America.

Given the exercise we propose in the following section, it is worth focusing on the comparison of the demographic factors and on the smoothed saving profiles between Thailand and Mexico. The demographic factors confirm the aggregate figures: the demographic transition is much more advanced in Thailand, in that fertility rates are much lower and family size is smaller. By the size of the cohort effects, however, it is likely that Mexico will be in a similar position in a few years.

The picture emerging from saving behaviour is more complex and of more difficult interpretation. If we compare the aggregate saving age profile, in Mexico we find a mild hump-shape, with a peak around age 60. In Thailand instead, the profile is steadily increasing with age. This picture, however, hides strong differences among education groups. For both countries, the better-educated individuals do not seem to show any tendency to decreasing saving rates in the last part of the life cycle. In Thailand, similar patterns emerge for the other two groups, even though the profile for the least educated is basically flat, rather than
increasing. In the case of Mexico, the two lower groups show a mild hump in the last part of the life cycle. It is surprising that a mild hump is observed in the aggregate data. Presumably, this is because although most of the saving is done by the better educated, their population weight is much lower than for the other two groups.

If we move on to the cohort effects, the differences between the two countries are even more apparent. In Thailand, the two groups with more education show strong positive cohort effects, while in Mexico a similar pattern is only observed for the most educated. At the other extreme, the uneducated in Mexico have negative cohort effects, while in Thailand they are mildly positive. Time effects, as expected, also differ markedly. In Mexico there is a strong negative shock in 1996, while in Thailand, time effects are mostly positive. The effects are reinforced when cohort effects are assumed to be equal to zero, and interestingly, time effects in both countries are stronger (more positive) for the most educated groups.

6 Projections to the Future

Perhaps the main question that remains open after documenting the large differences in household savings between LA and EA, is if the gap is likely to narrow in the future, or if it will continue to expand. For a believer of a standard version of the life cycle model, there are reasons to believe that the gap will narrow. Specifically, Latin America and the Caribbean is on the verge of a fast demographic transition which will result in population shifts toward age groups that should be expected to save more. Although less pronounced, the predicted demographic changes are somewhat similar to those that preceded the boost in private savings rates in East Asia. Whether this expectation is going to be fulfilled depends largely on the shape of the saving age profile and how that is going to evolve in the future.

The basic idea we try to investigate in this section is the following. If one believes that life cycle saving are important and that saving is concentrated among certain age groups, then an economy or a region with a larger fraction of the population within that age group should

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11 Bloom and Williamson (1998) and Behrman, et.al. (1999) are among the works that have hypothesized about this. Attanasio and Violante (2000) simulate the effects of demographics and private savings and predict a large increase in the Latin American region as a result of future reductions in the old dependency ratio.
save more (neglecting possible general equilibrium effects on factor prices). Countries with
high young dependency are expected to save less, mostly because larger shares of their
population are at ages characterised by investment (e.g. in human capital), than by generating
income and enhancing saving capacity. Countries with high old dependency ratios are
expected to save relatively less because the old are using resources accumulated in the past
through individual savings, pension schemes, or other social benefits to maintain their
consumption above their current income levels. In this section we want to test the plausibility
of this assumption and quantify the magnitude of the possible changes using both macro and
micro evidence.

We start with some evidence based on aggregate cross-country regressions, relating saving
rates to demographic variables. We then use the microeconomic evidence documented in
Section 5 to check whether aggregating the individual saving profiles using projected
demographic trends leads to substantial changes in aggregate saving rates. We also discuss
the main driving forces behind the trends.

While we think that both sets of exercises are useful, the projections we present should still
be taken with care. In different ways, both exercises are based on simple reduced form
relationships, and forecasting using these relationships implies assuming that the
relationships are stable over time. In the case of the aggregate evidence we have to assume
that the relationship we estimate in the cross-country regressions is stable over time. In the
case of the projections based on the micro age profiles, we need to assume that these saving
profiles (and income profiles used to weight them) do not change in the future. Changes
could be induced by changes in the shape of the earning life-cycle profiles, changes in factor
prices (wages and interest rates) and, in the case of models with habit formation, by the
process of growth itself. With these caveats in mind, however, we should stress that the
exercises proposed should serve more as benchmark calculations to quantify the potential
effects that demographic trends and the existing evidence on life cycle saving imply.
To look into the relationship between aggregate savings rates and demographic changes, we follow Behrman, et.al. (1999), who explore the associations between changing age structures and a series of aggregate variables over time using panel data for a large number of countries in all regions in the world. Their method is similar in spirit to the “smoothing” techniques used in Section 5 to identify age effects in the data. It consists in estimating fixed effects regressions in which the dependent variable is the aggregate variable of interest and the explanatory variables are dummy variables representing the average age of the population in each country.\(^{12}\) The specific regression is:

\[
X_{i,t} = \alpha \text{AD}_{i,t} + \beta \text{year}_{i,t} + \gamma \text{country}_{i} + \epsilon_{i,t}
\]

where \(X\) in our case is the aggregate domestic savings rates for country ‘i’ and year ‘t’; AD is a vector of 19 dummy variables indicating the average age of the population of a country in that particular year (the dummy for average age 19 is always the excluded category), the variable year indicates the year of each observation, the variable country indicates the country of each observation and \(\epsilon\) is the error term.\(^{13}\) The coefficient estimates for the elements in the AD vector reveal whether, after controlling for country fixed characteristics and time effects, the \(X\) variable shifts in some particular way as the average ages of the population of a country change. It must be stressed that the reduced form coefficient estimates are more of a descriptive device to inform on the association between the demographic structure and the dependent variable. They should not be interpreted with causality because they do not account for general equilibrium effects, and do not measure inter-generational welfare consequences.

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\(^{12}\) There are many ways of summarizing information on the age structure of a country. They use the mean age, which has the disadvantage of not summarizing all relevant information about the age structure of a country, but it simplifies the interpretation of the results and conveys almost the same information as would alternatives such as the division among young, working-age adults, and old. The mean age is in fact highly correlated with the population shares of these broad groups. The correlation coefficients between the country average age and the share of the population in the 0-14, 15-64, 65 and over groups, are -.97, .89, and .96, respectively, for 1950-1995.

\(^{13}\) There are 19 age dummies because the average age of the population in the countries considered during the period 1950-1995 span over 19 average ages.
Figure 6.1 presents the results from regression (3) using aggregate domestic savings as independent variable. The figure indicates along the horizontal axis the average age of the population in each country at time ‘t’ and we indicate the average age of groups of LA countries for 1995. We present three patterns. The solid line corresponds to the coefficients summarizing the association observed historically between aggregate savings and average age in all Latin American countries where information on domestic savings is available. The second is the historical pattern observed in East Asia. We present the estimates up to age 32, which is the average that LA is expected to have in the year 2030.

The results show that in East Asia, as country average ages increase from the ages 22 to 27 the savings rate increased sharply and reach a peak at around 31 years of age. In contrast, in the average Latin American country going through the same ages, domestic savings are flat but then increase substantially, although still at much lower rates than the surge observed in East Asia. So, the pattern for East Asia is much more pronounced and closer to the life-cycle hypothesis prediction. The steeper pattern for East Asia suggests that the region took great advantage of the early part of the demographic transition to boost savings. The early stage of the demographic transition in LA so far is associated with no increase in savings.

What about the future? Mexico and Peru, who are examined in this paper, are still at a relatively early stage of the transition as compared to the average Latin American country (see the horizontal axis in the figure). Their average age in 1995 was of around 25.5 years. So, the main question is if even though savings rates have not surged as in East Asia, will the demographic change be associated with higher savings in these countries. One way to assess the potential increases in the future is to simulate the pattern of domestic savings rates in LA after age 27, but by using the historical pattern observed in all other countries of the world. This simulation is presented in the figure with the line starting at average age 27, and shows that in the rest of the world the increase in saving associated to these ages is much steeper. Thus, if they continue the pattern in the region, Mexico and Peru are probably at the verge of important increases in savings due to the demographic transition, but under the current circumstances, the raises will be smaller than those observed elsewhere. The difference with the world pattern, where the increases are about twice the size after age 27 is a benchmark to assess the full potential of the demographic opportunity.
6.2 Forecasting the evolution of household savings with micro data

This subsection uses the evidence on the age profiles and the micro data in Section 5 to forecast future aggregate household saving rates. The method and data are different to what we use for Figure 6.1. In terms of data, in that figure we consider all domestic saving, of which household is one of the components (the rest are savings by firms and the public sector). One important difference between the micro and aggregate data, is that presumably, public and firm’s savings already account for pension assets and liabilities, so in some sense the micro data has more limited focus. However, as already noted, aggregate savings figures in the National Accounts are usually measured with large error. So, even though the analysis with micro data excludes some important elements of household savings, there is considerable gain in that we are able to measure savings with much more precision. Moreover, the micro analysis allows to identify some of the mechanisms driving the dynamics of savings. In this subsection we first discuss the mechanics of the method, and then present our evidence on Mexico and Thailand.

6.2.1 Method

To forecast aggregate household saving rates using the evidence presented in section 5 we basically use the accounting identity (1), the smoothed profiles we estimated above and demographic projections. Specifically, for any year starting from the late 1990s, we compute:

\[ \hat{s}_{tg} = \sum_{c} \hat{s}_t \frac{\hat{Y}_{tc} N_t^c}{\sum_{c} \hat{Y}_{t} N_t^c} \]

Where \( \hat{s}_t^c \) is the saving rate of group \( c \) at time \( t \) predicted by the smoothing procedure used to produce Figures 5.1.10 and 5.3.10. In particular, we use the estimated age profile (if \( c \) is the year of birth of a cohort, its age will be \( t-c \) at time \( t \)), and the relevant cohort effects. An analogous procedure is followed to compute \( \hat{Y}_{tc} \). That is, we estimate age and cohort effects using the same procedure as to identify the age and cohort effects for saving rates reported in Figures 10 and 11. The \( N_t^c \), instead, are obtained from UN demographic projections.\(^{14}\)

\(^{14}\) United Nations Demographics Data, 1998 revision.
We define the aggregate saving rate as the rate of the households aged 23 to 75. As we forecast aggregate saving rates far into the future, new cohorts will join the sample and some cohorts will leave it. For the new cohorts we use the same age profile as for the other cohorts and the cohort effect of the youngest cohort in the sample. This exercise can then be extended to consider different education groups. One simply needs to repeat the exercise for each education group and then aggregate across education groups given some projections about each group’s relative sizes. As we do not have forecasts about the education attainment of future generations, for future cohorts we use the proportions observed in the youngest cohort. This procedure ignores the fact that future generations are likely to be better educated. On the other hand, ignoring education groups completely is equivalent to assuming that changes in the composition of future households will leave the shape of the life cycle saving rates profile unchanged, which is obviously unrealistic.

Our ‘forecasts’ should be taken with extreme caution. First of all, we should stress that our aim is not to reproduce the level of aggregate saving rates or efficiently forecasting its evolution. As we discuss above, there are many reasons why micro data do not match up exactly to aggregate statistics. These reasons are then compounded by the fact that the shape of the life cycle profile is likely to change as consequence of changes in its determinants. Our more modest aim is to understand what are the implications of our estimated age profiles and the predicted demographic trends for the evolution of aggregate saving rates. The reasons why even this limited exercise has to be taken with caution are several. First, as already stressed we identify age and cohort effects under the arbitrary normalization that year effects have zero mean and no trend. Second, we assume that the age profile for saving rates and income is the same across cohorts. While cohort-specific age profiles are formally identified, given the limited extension of our sample period, each cohort is only observed over a short interval of its life cycle. This limitation forces us to impose the same age profile across cohorts. Third, even if existing cohorts (within an education group) have the same age profile for saving rates and income, it is likely that changes in wage profiles, in family size and composition, labor force participation, and in institutional factors, will, in all likelihood, have an effect on saving age profiles. Fourth, changes in the stock of human and physical capital are likely to change wage rates and interest rates, inducing further changes in age profiles. With all these important caveats, however, our exercise is useful to quantify the possible
importance of changes in the demographic composition of the population on aggregate saving, given the observed behaviour. Future research will address the issue of how individual saving-age profiles will change as a consequence of changes in demographics, human capital, pension etc.

6.2.2 The evidence based on the micro simulations

We start with the forecast for Mexico. Figure 5.1.10 shows the age pattern used for the prediction. Cohort effects are taken from Figure 5.1.11. The relative size of broad age groups used for the simulations is plotted in Figure 6.2.

Two exercises are performed. In the first we use the overall population age profile and cohort effects (the top-left panel of Figures 5.1.10 and 5.1.11). In the second we use education-specific profiles and cohort effects (the remaining three panels of Figures 5.1.10 and 5.1.11). To aggregate across education groups we use the proportion in the sample for cohorts currently alive and the proportion in the last cohort for future cohorts.

Both sets of forecasts, plotted in Figure 6.3, show a marked increase in aggregate saving rates that starts leveling off only around 2040. The increase without taking into account the education split is actually higher, even though the forecast that uses the education specific profiles does, to a limited extent ‘catch up’ with the one that does not.

The exercise for Thailand is very similar in nature. The profiles in Figures 5.3.10 and the cohort effects in Figure 5.3.11 are used together with the UN projections for the Thai population, to compute the relevant forecasts. The forecasts are plotted in Figure 6.4 and show an even more marked increase than in Mexico.

While at first sight the Mexico forecasts seem to support the hypothesis that demographic trends will lead to an increase in aggregate saving rates, a more careful consideration of the mechanics behind the forecasts shows that this is not the case. The demographic shifts actually play a small role. The main reason for this is because of the lack of a hump in the shape of the saving age profiles. Therefore, even when the population share of individuals
aged 40-60 increases, as it is projected to do in the next 40 years, this will have little effect on aggregate saving rates. Most of the effect is driven by the cohort effect. Notice that in Figure 5.1.10, the cohort effect of the youngest cohort is the highest. As we are giving that intercept to future cohorts that enter our computation, as older cohorts (with lower intercepts) disappear, the aggregate saving rate increases. The reason why the increase is lower in the case of the education specific profiles is because the cohort effect for the first cohort ‘averaged across education groups’ is lower than that estimated for the whole population. The reason for the relative ‘catching up’ is due to the fact that as the population becomes more and more similar to the first cohort, not only they will have the intercept of that cohort, but also the education shares of that cohort. As the youngest cohort is more educated, the increase in the saving rate is slightly quicker after the first few years.

Very similar considerations hold for Thailand. There are two noticeable differences. First the increase is more marked than in Mexico and the forecast that uses education specific profiles catches up faster. We should not read much into the first effect as the increase is mainly driven, as for the case of Mexico, by the estimated intercept for the first cohort. Moreover, we should stress again that the absolute level of these profiles does not have a very straightforward interpretation for the definitional and measurement issues discussed above.

Given that the projected increase for both Mexico and Thailand is driven by the estimate of a single parameter, these results should be taken with extreme care. On the other hand, it is a fact that, given our identification assumptions, younger cohorts seem to be saving more than their predecessors. The issue is whether this pattern can be maintained into the future. The answer depends, in all likelihood, on the evolution of the determinants of savings.

In section 5, we show that the shape of the estimated profiles depends strongly on the assumption one makes to identify the age profile of saving rates. If one assumes that all the trends observed in the data are originated by either cohort or age effects and that year effects have zero mean and are orthogonal to such trends, neither in Mexico, nor in Thailand, there is strong evidence of a hump shaped saving profile. On the other hand, if one assume that there are no cohort effects, so that year effects can be estimated on an unrestricted fashion, the Mexican age profiles show a marked hump, while the same is true in Thailand for the best
educated households.\textsuperscript{15} Both sets of profiles can be used to forecast future household saving rates to check to what extent the demographic transition is likely to affect aggregate household saving rates. In particular, we perform the exercise described above for Mexico using the numbers plotted in Figure 5.1.13 as age profile for saving rates, which, for the population as a whole and for two of the three education groups, show a marked hump. This approach, however, assumes that there are no cohort effects, so that we shut down the main source of increase in the aggregate saving rate in Figure 6.3.\textsuperscript{16} The result we obtain is that saving rates start to decline around 1995 and keep declining for about 20 years, to increase around year 2020 as the population share corresponding to the hump in the saving rate profile starts to increase. The size of the increase, however, is miniscule, at about 0.002. There are two reasons for this. First, the hump in Figure 5.1.13 is not extremely pronounced, and second, even though the demographic change we project is relatively large, this results only in a change in weighting that cannot have a very large effect given the size of the hump.

Although the scope of this exercise is limited, we can conclude that, given the estimated shapes of the saving rates age profiles (and the projected demographics), it is unlikely that these forces will result, in their own right, in a large shift in aggregate saving rates.

A more interesting avenue to consider is the possibility that the shape of the life cycle saving profiles will change in the future. To forecast this, however, it is necessary to adopt a more structured approach where saving rate profiles are related to their determinants. In a future draft we plan to employ the methodology proposed by Attanasio and Banks (1998) to perform this exercise. The idea is to assume that all age and cohort effects observed in the saving profiles originate from age and cohort effects in the saving determinants, things such as demographics, earnings, and so on. If one estimates the shape of the age profile and cohort effects for these determinants, one can then relate them to the observed saving rate and use this relationship to forecast future saving rates.

\textsuperscript{15} Deaton and Paxson (1994) and Paxson (1994) claim that the absence of cohort effects in saving rates is an implication of the life cycle model. This, however, is only true if cohort effects in current income and consumption exactly cancel out.

\textsuperscript{16} In this exercise the level of saving rates is particularly difficult to pin down as year effects are, by definition, unpredictable.
6.3 The Role of International Financial Flows

So far in this section we have ignored the issue of international capital flows. These may be a crucial element in the future for LA and the most developed regions. This is partially illustrated in figure 6.1, which shows that historically, domestic savings rates tend to flatten out as countries age. This is the case in EA, LA, and the world as a whole. In the context of the life-cycle model, the interpretation is that as populations age, a higher proportion of individuals are retired and, where resources are available, living on past savings. The developed countries are much more advanced in the demographic transition than LA, and this demographic mismatch implies that domestic savings rates will start flattening out much sooner than in LA.

Section to be completed by including discussion of international financial flows and implications for domestic savings across regions.

7 Conclusions
Figure 2.1

Figure 2.1a
National Saving as a Share of GNP in East Asia and Latin America

Figure 2.1b
Domestic Saving as a Share of GNP in East Asia and Latin America

Figure 2.1c
Young Dependency Ratio in East Asia and Latin America

Figure 2.1d
Women as a Share of Total Labor Force in East Asia and Latin America

Figure 2.1e
Stock of Years of Schooling in East Asia and Latin America

Figure 2.1f
PPP GDP per Capita in East Asia and Latin America
Figure 2.2
Figure 5.1.1

Figure 5.1.2

Figure 5.1.2a

Figure 5.1.2b

Figure 5.1.2c

Figure 5.1.2d
Figure 5.1.3

log family size by cohort and education

Figure 5.1.4

number of children by cohort and education
Figure 5.1.5

Figure 5.1.6
saving rates with and without durables

male wages

Figure 5.1.7

Figure 5.1.8
male and female participation

Figure 5.1.9

Mexico saving rates
smoothed age profiles

Figure 5.1.10
saving rates- no cohort effect assumption
smoothed age profiles

Figure 5.1.13

saving rates
year effects- no cohort effect assumption

Figure 5.1.14
log family size
by cohort and education

Figure 5.3.3

number of children
by cohort and education

Figure 5.3.4
log family income and consumption
by cohort and education

Figure 5.3.5

Figure 5.3.6

log total and non durable consumption - per capita
by cohort and education
Figure 5.3.7

Figure 5.3.9
Thailand - saving rates
cohort effects

Figure 5.3.10

Thailand - saving rates
smoothed age profiles

Figure 5.3.11
saving rates
year effects

Figure 5.3.12

saving rates- no cohort effect assumption
smoothed age profiles

Figure 5.3.13
saving rates: no cohort effect assumption

Figure 5.3.14
Figure 6.1

Average Age Pattern of Domestic Saving

- East Asian pattern
- Simulated LAC with world pattern
- LAC observed pattern 1950-95

Figure 6.2

Share of Different Age Groups, Mexico
Mexico forecast with and without education decomposition

Figure 6.3

Thailand forecast with and without education decomposition

Figure 6.4
Table 3.1

Average Cell size (number of households) per Country

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Year of Birth</th>
<th>Mexico</th>
<th>Peru</th>
<th>Thailand</th>
<th>Taiwan</th>
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<tbody>
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<td>9</td>
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<td>11</td>
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</table>

Source: Authors' calculations from household surveys.

Table 4.1

Household Saving, Demographics, Participation, Education and GDP In Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Aggregate Private Saving Rate*</th>
<th>Household Saving Rate</th>
<th>Young Dependency</th>
<th>Female Participation</th>
<th>Years of Schooling</th>
<th>PPP GDP Per capita*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>1996</td>
<td>25.4</td>
<td>9.5</td>
<td>0.59</td>
<td>0.4</td>
<td>7.2</td>
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<td>Thailand</td>
<td>1996</td>
<td>35.9</td>
<td>32.9</td>
<td>0.41</td>
<td>0.74</td>
<td>6.7</td>
<td>5,080</td>
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</table>

Source: Authors' calculations from household survey data. *from WDI (1999).

Table 4.2

Simulations of switching population weights and holding Age-specific Saving Rates constant

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<tr>
<th></th>
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<td>0.38</td>
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<td>0.10</td>
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<td>0.05</td>
<td>0.04</td>
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<tr>
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<td>Weighted saving rate</td>
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<td>2.38</td>
<td>3.26</td>
<td>3.99</td>
<td>4.02</td>
<td>3.72</td>
<td>3.62</td>
<td>3.16</td>
<td>2.96</td>
<td>2.01</td>
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<td>Average saving rate</td>
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<td>0.07</td>
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<td>0.10</td>
<td>0.12</td>
<td>0.12</td>
<td>0.10</td>
<td>0.10</td>
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<td>Population weight</td>
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<td>0.13</td>
<td>0.12</td>
<td>0.10</td>
<td>0.08</td>
<td>0.07</td>
<td>0.06</td>
<td>0.04</td>
<td>0.03</td>
<td>0.02</td>
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<tr>
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<td>Weighted saving rate</td>
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<td>1.39</td>
<td>0.53</td>
<td>0.92</td>
<td>1.44</td>
<td>1.61</td>
<td>0.82</td>
<td>0.79</td>
<td>0.67</td>
<td>0.48</td>
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<td>0.17</td>
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Source: Authors' calculations from household surveys.
### Table 4.3

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<th>Average saving rate</th>
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<th>Weighted saving rate</th>
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**Saving in Mexico with Thai weight**

7.84 4.28 1.59 1.96

**Saving in Thailand with Mexican weight**

31.68 16.92 8.55 6.20

*Source: Authors’ calculations from household surveys.*

### Table 4.4

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<th>Country</th>
<th>Saving Rate by Quintile</th>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
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<td>-0.01</td>
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*Source: Authors’ calculations from household surveys.*

### Table 5.1

<table>
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<th>Country</th>
<th>Year</th>
<th>s1 (dur+ndur)</th>
<th>s2 (ndur-edu-h)</th>
<th>s3 (ndur)</th>
<th>s4 (s1-edu-h)</th>
<th>s1 (dur+ndur)</th>
<th>s2 (ndur-edu-h)</th>
<th>s3 (ndur)</th>
<th>s4 (s1-edu-h)</th>
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<th>Household Saving</th>
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<tr>
<td></td>
<td>1989</td>
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<td>7.3</td>
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<td>1986</td>
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<td>1988</td>
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<td>9.5</td>
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<td>26.3</td>
<td>34.9</td>
<td>1.7</td>
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*Source: Authors’ calculations from household survey data. Domestic saving rates and GDP are taken from the World Development Indicators, 1999 version.

Notes:
- Dur=expenditures in durable goods; ndur=expenditures in non-durables; educ=expenditures in education; h=expenditures in health
- The estimates for 1984, 1989 and 1992 for Mexico do not coincide exactly with those reported in Table 1 in Székely (1998), who uses the same data and definitions. The difference is that Székely adjusts consumption for interest payments from debt.*

57
<table>
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<th>Country</th>
<th>Years</th>
<th>Total Change (points)</th>
<th>Age Profile Effect</th>
<th>Effect of Change in weights</th>
<th>Effect of Change in Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>1996-84</td>
<td>1.0</td>
<td>1.3</td>
<td>-0.2</td>
<td>-1.7</td>
</tr>
<tr>
<td>Thailand</td>
<td>1996-75</td>
<td>19.5</td>
<td>9.03</td>
<td>10.4</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Source: Authors' calculations from household survey data.