THE LIFE-CYCLE MODEL OF INCOME, CONSUMPTION AND SAVING IN MEXICO
(Extended abstract)

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Introduction
In recent years the analysis of relationships between changes in age structure and economic performance has attracted extensive attention. When a population is divided by age groups it is immediate to realize different economic and social roles and expectations. Children require intensive investment in health, nutrition and education, prime-age adults supply labor and savings and the elderly require expenditures on health care and retirement income. In this sense, an age structure concentrated at prime-age adults reduces the dependency ratio, and is seen as an advantage characterized as a demographic window. The assumption is that a low dependency ratio boost saving, investment and income per capita, helping to build up social and economic supports in society known as a demographic dividend (Bloom et al.).

In this context, life-cycle hypothesis provides the conceptual framework for the analysis of age structure and economic behavior. Several empirical studies based on the analysis of aggregate cross-national data estimates the consumption, income and saving age profiles. For example, Mejía (2008) estimated consumption, labor income and life cycle deficit using the NTA methodology. On the other hand, Deaton and Paxson (1993 and 2000) employ a pseudo panel or synthetic panel to identify the role of household consumption and saving.

Since, the life cycle is a longitudinal concept, referring to the passage through life on an individual or a generation, we select the pseudo–panel strategy and estimate age effects (life cycle) and control by cohort effects (year of birth) and period effects (business cycles). We are looking across ages for the same household or same cohort of households, but at the experience at different ages of different groups of households, whose members where born at different dates and has had quite different lifetime experiences of earnings, consumption and saving. Without controlling for these variables, many of which are likely to affect the level and shape of the age profiles, we cannot isolate the pure effect.

This research describes the life-cycle income, consumption and saving patterns of Mexican households. If the life-cycle hypothesis is correct, the age profile of income, consumption and saving should be relatively higher for the young than the old and we could accept the supposition of an optimistic link between demographic change and saving in the aggregate economy. We construct a pseudo-panel from the Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH) between 1994 and 2008.

The extended abstract is organized as follows. Section 2 explains the estimation of the life-cycle model of income, consumption and saving in a synthetic cohort technique. Section 3 presents a brief description of the data and variables used in the analysis. Section 4 gives the principal results.

Estimating a life-cycle model of income, consumption and saving in a pseudo–panel
In the presence of time series of household surveys with information on consumption an income, it is possible to track the behavior of cohort overt time, and this to avoid one of the major difficulties associated with a single cross section of consumption and income. Such data also have a direct interpretation in terms of the life-cycle hypothesis, with the age effects, which come from tastes, separated from the cohort and period effects (Deaton, 1997).

The technique was proposed by Browning, Deaton and Irish (1985) and it relies on the construction of $n$ groups or cohorts, each with a fixed membership that remains the same throughout the entire period of observation. Thus, it is possible to follow the average behavior of variables related to these cohorts.
In this paper each cohort consists of those households whose heads\textsuperscript{1} were born in the same five years period. We eliminate from the sample all households headed by individuals younger than age 21 or older than age 79, which mitigates problems associated with the effects of changing headship, differential migration and mortality by age group. Thus, cohort one is composed by household heads that were born between 1920 and 1924, cohort two by those that were born between 1925 and 1929, and so on until 11 cohort. In this form it is possible to follow the behavior of groups of homes through time, since the first cohort will have a mean age of 72 years old in 1994, year in which the first survey taken, and 74 years old during the next survey in 1996. The cohort definition, age in 1994 and 2008, and cell size are shown in Table 1.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Year of birth</th>
<th>Period</th>
<th>Age in 1994</th>
<th>Age in 2008</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1920-1924</td>
<td>1994 - 2002</td>
<td>72</td>
<td></td>
<td>2 995</td>
</tr>
<tr>
<td>2</td>
<td>1925-1929</td>
<td>1994 - 2008</td>
<td>67</td>
<td></td>
<td>4 159</td>
</tr>
<tr>
<td>3</td>
<td>1930-1934</td>
<td>1994 - 2008</td>
<td>62</td>
<td>76</td>
<td>6 565</td>
</tr>
<tr>
<td>4</td>
<td>1935-1939</td>
<td>1994 - 2008</td>
<td>57</td>
<td>71</td>
<td>7 691</td>
</tr>
<tr>
<td>5</td>
<td>1940-1944</td>
<td>1994 - 2008</td>
<td>52</td>
<td>66</td>
<td>9 747</td>
</tr>
<tr>
<td>6</td>
<td>1945-1949</td>
<td>1994 - 2008</td>
<td>47</td>
<td>61</td>
<td>11 443</td>
</tr>
<tr>
<td>8</td>
<td>1955-1959</td>
<td>1994 - 2008</td>
<td>37</td>
<td>51</td>
<td>15 711</td>
</tr>
<tr>
<td>9</td>
<td>1960-1964</td>
<td>1994 - 2008</td>
<td>32</td>
<td>46</td>
<td>17 685</td>
</tr>
<tr>
<td>10</td>
<td>1965-1969</td>
<td>1994 - 2008</td>
<td>27</td>
<td>41</td>
<td>17 004</td>
</tr>
</tbody>
</table>

Source: National Survey of Incomes and Expenditures of Households, INEGI.

After, we analyze consumption and saving over the life cycle by using the approach of Deaton and Paxson (1993 and 2000). The general estimations of income, consumption and saving rate are defined as:

\[
Y_{ct} = \alpha_c + A \beta + C \gamma + Y \delta + X \varphi + u_{ct}
\]

\[
C_{ct} = \alpha_c + A \beta + C \gamma + Y \delta + X \varphi + u_{ct}
\]

\[
s_{ct} = \alpha_c + A \beta + C \gamma + Y \delta + X \varphi + u_{ct}
\]

where $Y_{ct}$ is a vector column of the average non-durable consumption corresponding to each cohort in each period. $A, C$ and $Y$ are matrices of age, cohort and period dummies. $\beta, \gamma$ and $\delta$ are the corresponding age, cohort and period effects on saving rates and $u_{ct}$ is the error term. In the next equation, $C_{ct}$ is a vector column of the average non-durable consumption and $s_{ct}$ is a vector column of the average saving rates.

However, the identity age = period (year) – cohort (year of birth), implies that all three effects cannot be identified in a linear model. A number of “solutions” to this identification problem have been offered in the literature (Mason and Fienberg, 1985), all of which assume restrictions on the specification of the general model, usually by imposing some sort of functional form assumption on the way the three effects enter. We use a normalization provided by Deaton (1997), which makes the year effects orthogonal to a time trend, so that all growth is attributed to age and cohort effects:

\[
d_t = d_t - [(t - 1)d_2 - (t - 2)d_1] \quad t = 3, ..., T
\]

where $d_t$ is the usual year dummy, equal to 1 if the year is $t$ and 0 otherwise.

\textsuperscript{1} The household head is defined as the person recognized as the head by the household members.
In the regressions, the non-durable consumption and saving rate are regressed on age, cohort and period dummies, and control variables (average number of workers, children in ages 0-14 and education level of head-household).

Data and variables
In this paper we use data from the ENIGH conducted by Instituto Nacional de Estadística y Geografía INEGI. This survey, conducted each two years between 12 806 and 29 468 households, size of the survey varies from year to year. It has national representation for urban and rural areas. Data is on demographic and socio-economic variables, and detailed information about income and expenditures of each household. We use these cross–sectional data between 1994 and 2008.

The main variables are: disposable income, non-durable consumption and saving rate. The disposable income is defined after taxes, includes monetary and non–monetary components. The non–durables consumption excludes all components of expenditure that have an element of durability and includes monetary and non–monetary components. Both, income and consumption are deflected using the National Index of Prices and Consumption, 2002. Saving is defined as the difference between households’ disposable income and non–durables consumption, the saving rates is the ratio of saving to household disposable income.

Characterization of Income, Consumption and Saving Patterns
Figure 1 plots mean household disposable income against the age of the household head. Households income shows clearly the standard inverse–U shape, rising until the head reaches age 57. The period effects are clearly seen, with income falling for all cohorts over the 1994-1996 periods, for the peso crisis. Real GNP per capita fell 9.2 percent in 1995 and mean manufacturing wages fell by 21 percent over the 1994-1996 period (Mckenzie, 2001). As figure 1 shows, there is a high correlation between disposable income and non-durables consumption, which is not consistent with the life-cycle model. In consequence, the saving rate presents a substantial amount of noise and a fairly pronounced hump is quite evident.

After normalization provided by Deaton (1997) we found that age, cohort and period effect are statistically significant in the income, consumption and saving rate equations. Although the age effects are in general statistically significant, it is important to remark that in the saving rate equation only age (45-49) until age (75-79) parameters are significant and positive, this is an unexpected result, indicating that saving rate is significantly increasing in the last part of the life-cycle. Thus, the effects of age structure on saving are not coherent with
the life-cycle interpretation of the data. In particular, there is no evidence of dissaving among the old; indeed, the saving rate increases with age at least up to 79 (Figure 2). A plausible explanation is the presence of age selectivity. In this case the potential dissevers are those who have already exhausted their assets, are living with their children, or are dead. Whatever, this finding is common in other countries (Deaton, 1997).

Turning to the cohort and period effects in the saving rate equation, the statistical significance of the estimated cohort parameters are in line with the increase in the equations of the recent birth cohorts, indicating that in Mexico the younger cohorts tend to have higher incomes and saving rates, which is perhaps attributable to bequest motives. The crisis business cycle in 1994 and 2006 is seen to have caused income and rate saving to decline for all cohorts.

Figure 2. Age, Cohort and Period Decomposition of Saving Rates

Source: National Survey of Incomes and Expenditures of Households, INEGI.

Bibliography


