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Left Behind in the Economic Crisis: Poverty among the Elderly in Costa Rica
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**PAPER PRESENTED AT THE
THIRD INTERNATIONAL POPULATION CONFERENCE
OF THE CENTRAL AMERICAN ISTHMUS, 2003**

Left Behind in the Economic Crisis: Poverty among the Elderly in Costa Rica
(Translation of Spanish Version)

Gilbert Brenes Camacho[1]

RESUMEN

La crisis económica de inicios de los años ochentas impactó de muy diversas maneras a la Costa Rica del siglo XX. Las acciones gubernamentales desde 1982 tuvieron éxito en reducir la proporción de personas pobres desde un 35% en 1985 a un 23% en el 2000. El presente artículo utiliza las Encuestas de Hogares entre 1981 y 2002 y los Censos de Población para realizar una estimación de los efectos de cohorte, edad y período, y así mostrar que la pobreza entre la población adulta mayor en Costa Rica se puede entender como un efecto de cohorte. Esta condición de pobreza de estas cohortes está asociada principalmente con su bajo nivel de escolaridad, principalmente entre los hombres. La probabilidad de haber tenido derecho a pensión por jubilación y el hecho de que los menos educados recibían un ingreso bajo al final de su vida laboral median en la relación entre la educación y la pobreza como un efecto de cohorte.

ABSTRACT

The economic crisis at the beginning of the eighties impacted 20th-century Costa Rica in many different ways. Government programs were successful in reducing the proportion of poor people from 35% in 1985 to 23% in 2000. This article utilizes official Household Surveys corresponding to the period 1981-2002 and Population Censuses to perform an estimation of age, cohort, and period effects, in order to show that poverty among the elderly can be understood as a cohort effect. Their poverty conditions are associated with their low schooling, mainly among men. The probability of having the right to a retirement pension and the fact that individuals with lower educational levels earned low income during their later working years, intervene in the relationship between schooling and poverty as a cohort effect.

Soon after the end of the civil war in 1948, Costa Rica underwent political and economic changes that aided the expansion of the social benefits initialized in the 40's, such as universalizing Social Security, promoting health and educational policy, and providing infrastructure and services to both rural and urban communities. Nevertheless, at the end of the 70's, increasing oil prices had a strong negative impact on many countries around the world. Costa Rica was no exception, and during the 1980 – 1982 period it went through an economic crisis characterized by hyperinflation, increased unemployment and underemployment rates, and the declaration of a moratorium on

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foreign debt payments (Barahona Montero 1999a). The governments after 1982 were relatively successful in promoting economic recovery by changing the development model based on import substitution to one promoting non-traditional product exports and tourism (Barahona Montero 1999a, González Mejía 1999). In spite of the recovery and public policies designed to combat poverty, since 1991, it has not been possible to reduce the proportion of poor households below 18%, maintaining an annual average of around 20%.[2] In addition, economists consider that within this one-fifth of the nation's population, there is a group of "hard-core poor", i.e., persons who systematically live on a minimal income, and who cannot easily climb out of their chronic condition (*Proyecto Estado de la Nación*-PEN 2002).

One group in which the proportion of poor is relatively high with regard to the rest of the population is that of the elderly: 31% of individuals 65 or more years of age live in households with incomes below the poverty line, according to the 2002 *Encuesta de Hogares* (National Household Survey). The objective of this paper is to show that if poverty among the elderly is associated with structural characteristics within this group of the population, its incidence can be represented as a cohort effect. In other words, a large percentage of the Costa Rican elderly would be living in poverty, not because old age leads to poverty, but because the characteristics that they acquired throughout their lives – given the historical moments they lived – make them more susceptible to being poor, in comparison with other groups born more recently. In order to provide separate estimates of the cohort, age, and period effects, we consolidated the *Encuestas de Hogares* from 1980 to 2002, whose basic dependent variable is the proportion of persons living in poor households. The paper presents variations of these effects produced by the inclusion of certain independent variables in the model, in particular the level of education of the cohorts. It also emphasizes the importance of the economic crisis at the beginning of the 80's on the incidence of poverty among the elderly, and at the end of the paper, we relate this phenomenon to educational levels among these generations and their access to Social Security.

Poverty among the elderly

The arguments that relate poverty to old age have been changing over time. Gratton (1996) considered that the growth of Social Security policies in the United States intended to provide income for the elderly within the framework of the "New Deal" reforms (1935) was contextualized by theories that described the elderly as victims of the industrialization process, since the latter were injurious to the economic welfare of the elderly. Epstein linked the low wages received by the working class to the impossibility of saving sufficient to prepare for the future (Gratton 1996). For Hurd (1989), public transfers to the elderly were justified on the premises that the elderly are more vulnerable to uncertainty, since their probability of recovery is lower after a loss of income or expenses for medical services. However, both authors criticize the fact that these theories are maintained under the current American panorama, since there is

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[2]   In the week prior to the presentation of this article at the Conference on "Population of the Central American Isthmus", the Costa Rican Government announced that the percentage of poor households had declined to close to 18%, a statistically significant difference with respect to the preceding year (*La Nación*, November 7, 2003).

evidence showing that the elderly constitute the social group with the greatest growth in income during the second half of the 20th Century (Gratton 1996, Hurd 1989, Preston 1984). Gratton even suggests that during the era of "New Deal" social reforms, the elderly were already in a relatively advantageous economic position over other vulnerable groups, and that these reforms were inspired by intentions within the governmental bureaucracy to better control these transfers. The system has continued to introduce new benefits, since the elderly have been progressively acquiring greater political power as a pressure group (Gratton 1996, Preston 1978).

Ginn and Arber (1991) consider that this perspective, which perceives the elderly as an egotistical and greedy political group is stereotyped and discriminatory (they call it "ageism"). They also critique that the focus is on ageing as a social problem solely in the sense of the economic burden that it represents, due to their health and care requirements, since they opine that this is another variant of the stereotypical view of the elderly. They propose that studying elderly populations as a single node hides the inequalities of income, class, and gender existing within this social group. Based on a British household survey (General Household Survey), the authors show that the differences in income from work, as well as income from retirement pensions explain class and gender differentials. In other words, individuals with greater socio-economic status have a greater probability of having the right to a private retirement pension, and on receiving it, the amount will be higher than that among persons of a lower socio-economic status who have the same right. Ginn and Arber explain how disadvantages to women in the labor market have an impact on the unequal relation between genders in old age, particularly because private pension plans penalize women who have to assume their role as homemakers, whether this is due to not working, working part-time or suffering periods of unemployment. Other research analyzes how the transition to retirement and widowhood reduces already tight incomes due to needs and increases the probability of becoming poor among the elderly households in the United States (Ross *et al*. 1987, Holden *et al*. 1988). Holden *et al*. (1988) also emphasized the importance of income prior to retirement and its translation into greater pension amounts as mediators in reducing the probability of falling into poverty.

The evidence produced by the official statistical institutes in Latin America indicates that in a majority of countries in Latin America with information, the elderly not only represent a small fraction of all poor (calculated on the basis of the poverty line), but also that the probability that an elderly person is poor is lower than the probability for any younger person (See Figure 1 and Table A1 in the Appendix). Upon comparing the proportion of poor among adults 60 or more years of age with that of persons aged 10 to 59 years in the Dominican Republic, Costa Rica, El Salvador, and Honduras, the former proportion is higher than the latter in urban areas, and in the rural zones, Costa Rica is the only country in which the proportion of elderly is higher than the proportion for the younger population. According to these data, in rural Costa Rica, the probability that an elderly person is poor is almost 50% greater than the probability that a person aged 10 to 59 years is poor. Although this phenomenon appears to be common among Central American countries (including Dominican Republic), the document that is the source for these data (del Pópolo 2001) does not discuss their possible causes.

However, although in a majority of Latin American countries the elderly are at less of a risk of being poor than younger populations, researchers on the sub-continent reached the same conclusions as Ginn and Arber in the sense that within the elderly population there are sub-groups that have greater probabilities of suffering the effects of poverty. For Mexico, Wong and Espinoza (2002) showed the close relationship between educational level and income among Mexican elderly, a situation that is serious if one takes into account that they have an average number of years of schooling considerably below that of the younger generations (Montes de Oca 1996). "Furthermore, ageing may mean an economic deterioration, because the labor market has institutionalized the expulsion of the aged population by means of retirement, cutbacks, firings, etc. and because in general there is limited access to pension plans …" (Montes de Oca 1996: p.34). Ham-Chande (1996) indicates that rural workers, those in the informal sector and the unemployed are most vulnerable because they have the least probability of having Social Security or retirement plans. In this regard, in the results from Wong and Espinoza (2002), the persons with higher educational levels receive higher pension levels.

Historical Context 1940-2002

In order to understand how the aforementioned mechanisms operate in the Costa Rican case, it is important to understand the historical transformations that the country underwent during the 20th Century. Although we can mention several policies prior to this era, reform policies arose forcefully during the 40's, a period that Costa Rican historians and other commentators coincide in calling the turning point towards a different development style, which has been called the "Managerial State" or the "Benefactor State". Thus, the creation of the Social Security Fund (*Caja Costarricense del Seguro Social*, CCSS, 1941), the introduction of Social Guarantees into the Constitution (1942), and the promulgation of the Labor Code (1943), constitute the starting point for a series of public policies tending to improve the social situation of Costa Ricans (Barahona Montero 1999b). The establishment of the Supreme Electoral Tribunal in 1947 and the abolition of the army in 1949 aided in maintaining an uncommon political stability when compared to the rest of the countries in Latin America. The abolition of the armed forces also served to redirect resources towards an investment in health, education, housing, electrification, and rural aqueducts, among others (Barahona Montero 1999b). In economic terms, as in other Latin American countries, Costa Rica experimented accelerated growth on the basis of an import substitution model, which helped diversify the productive apparatus. Between 1950 and 1970, real GDP growth occurred at an average annual rate of 6.6% (Barahona Montero 1999a). Foreign investment in Costa Rica was stimulated by this development model as well as by aid coming from the United States as part of its "anti-communist" strategy, with initiatives such as the Alliance for Progress during the 60's (Segura 1999).

During the following decade, the Costa Rican economy was able to survive the two oil crises as well as growing macroeconomic imbalances, but social and economic progress was interrupted by the crisis at the beginning of the 80's. "Between 1980 and 1982, real GDP declined by 9.2%; the open unemployment rate climbed from 4.8% to

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9.4%; accumulated inflation reached the level of 157.6%; real wages declined around 30% and real per capita consumption also dropped by in a similar manner" (Barahona Montero 1999a: p.106). The governments following the socio-economic crisis redirected their social policies to remedy the prejudicial effects of the crisis, particularly to reduce poverty levels, in view of the fact that in 1983, 34% of households had incomes below the poverty line (Barahona Montero 1999b). Within the context of the Structural Adjustment Programs (*Programas de Ajuste Estructural,* PAEs) promoted by the World Bank, the Costa Rican State's social policy included actions such as increasing the real value of wages and salaries, promoting educational quality, and establishing a set of subsidies, such as the Social Compensation Program or the Housing Bond. Starting in the 90's, social policies were characterized by "… focusing social expenditures on the poorest sectors of society." (Barahona Montero 1999b: p.166). In economic terms, the import substitution-based development model and the preponderance of a single export crop were exchanged for one in which greater emphasis was placed on diversified production for external markets, foreign investment promotion, especially in non-traditional crops and more recently in high technology, reforms to the financial system, and a program to privatize public assets that did not achieve the scope the governments desired.

Costa Rican elderly at the beginning of the 21st Century benefit from the economic and social reforms from mid-20th Century, in some cases directly and in other cases indirectly. For example, a 70-year old Costa Rican in the year 2000, born in 1930, was an adolescent when the Social Reforms of the 1940's were promulgated; he joined the labor force during the years the Costa Rican economy was burgeoning, which was a period of full employment. Notwithstanding, the Costa Ricans born in that year did not benefit from the expansion of the educational system as much as their children and grandchildren have. Furthermore, the universalization of Social Security during the 60's and 70's was a gradual process, so that –and this will be mentioned in detail later- part of this population group was not contributing to the Disability, Old Age, and Death Regime in Social Security for an important fraction of their working lives. Returning to the field of benefits, these individuals born in 1930 were witnesses to the advances in health services that brought Costa Rica from a life expectancy of 42 years (precisely in 1930) to one of 78 years in 2000 (CCP 2003). This improvement in average survival for Costa Ricans (added to a reduction in fertility) has led Costa Rica to the starting point of the population aging process. Similarly, these Costa Ricans born in 1930 experienced the economic crisis at the beginning of the 80's, when they were 50 years of age, an age close to retirement. The development model proposed to alleviate the effects of the crisis did not fit well with the typical characteristics of this cohort. Thus, for example, in spite of the policies to diversify production, during the 60's and 70's, when this cohort was at an age with the highest economic participation, agricultural activity continued to be one of the most important sources of employment. Nevertheless, post-crisis economic policies were accompanied not only by a reduction in the relevance of agriculture as a generator of employment, but also the promotion of non-traditional crops requiring agricultural enterprise to put into practice new know-how (González Mejía 1999).

Thus, within this context, the initial objective of this paper is to show that the elderly constitute a group at social risk, since the incidence of poverty is high in this group. We also hope to show that this vulnerability grew, by their being able to take advantage of the changes that the country went through during the second half of the 20th Century, to a lesser degree than more recent generations. This process can be understood as a cohort effect.

Information Sources and Methods

The Household Survey program carried out by the current National Statistical Institute (*Instituto Nacional de Estadística and Censos*, INEC) constitutes the official source for measuring unemployment and poverty in Costa Rica. The first household survey program began in 1966. This paper used the surveys from the two most recent household survey programs: the one carried out between 1976 and 1986 (which were known as National Household Surveys: Employment and Unemployment), and the current program, which began in 1987 (called Multiple Purpose Household Surveys) (Céspedes and Jiménez 1987). Since the beginning of the most recent program, fieldwork is carried out once a year, and July is the reference month. The Surveys can be found online at the Internet website of the *Centro Centroamericano de Población*;[3] and we used the databases available on that site. This decision led to an analytical problem within the sample: who is poor and who is not? Since the battery of questions used to define poverty varied between the two programs (Céspedes and Jiménez 1987). In the 1976-1986 program, data on employment income were gathered, while in the program starting in 1987, data on income from other sources has also been gathered, such as retirement pensions, family transfers, public allocations, or investment dividends. Furthermore, the current cycle contains a more detailed series of questions to capture those employed, so that the measurement of wages or employment earnings is also more complete.

In addition to this situation, poverty estimates coming from the Household Surveys were made using the poverty line method from ECLAC. In order to use this method, we have to calculate a "market basket" of goods and services equivalent to those that a household would require to satisfy a minimum caloric intake. Although it is true that the same procedure was used in both programs, the market basket for 1976-1986 is based on a consumer survey different from that used for the 1987-2000 cycle (Céspedes and Jiménez 1987). These characteristics pose a question as to whether both these measurements of poverty are comparable. Céspedes and Jiménez (1995) concluded that is strictly statistical terms, they are not comparable. Therefore, the lack of comparability between the different Household Survey programs, and between these and the Population Censuses (of 1973, 1984, and 2000), may be affecting the results we present in this paper. An additional limitation consists of the fact that the poverty level is measured for the household as a whole and not for each person. Therefore, an individual with an income above the minimum wage may be classified as poor, if the per capita income of his/her household is below the poverty line. The present analysis could

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[3] http://encuestas.ccp.ucr.ac.cr/

be affected by this characteristic, since the probability that someone is classified as poor may depend on household variables (residential arrangements, differential participation in the labor market among household members, etc.) This type of variables was not included due to the difficulty presented by constructing them from the Internet site where the data were extracted. We hope that in the future it will be possible to incorporate them in a more detailed analysis or with other data sources.

With regards to the method selected, we decided to use the poverty line, since INEC calculates it on a yearly basis and it is included as a variable in the databases used for the analysis. This methodology captures specific variations of the indicator over time, but for this reason, has limitations for measuring more structural aspects of poverty, which are related to lifetime wealth accumulation. This means that a person who had low income during the reference period can be classified as poor, in spite of the fact that s/he owns a house or other assets. An alternate criterion for measuring poverty is that of Unmet Basic Needs (Céspedes and Jiménez 1995, PEN 2002a), but there is no measurement of poverty according to this criterion for each of the annual surveys.

In order to study the phenomenon under analysis, the methodological strategy followed utilizes a time series of the proportion of persons that live in poor households, in order to estimate age, cohort, and period effects. Thus, a procedure recommended by Angus Deaton (1997) was followed to analyze a set of cross-sectional studies as a time series, taking the cohorts as units of study. According to this author (1997), a set of cross-sectional surveys joined in a single database is limited by not allowing the dynamic within each cohort to be described. However, the proposed methodology allows us to control for non-observable fixed effects. Other advantages mentioned are: i) that it is not subject to the problem of sample loss (attrition) as are longitudinal studies which lose representativeness regarding the population under study for this reason; ii) that the proposed form of data management neutralizes a little bit more of the measurement error, because the variable followed over time is an average (or any other measure of position), which means that the errors in different directions are compensated; iii) that cohort level data allow us to extend a bridge between micro-analysis (individual data) and macro-analysis (the typically econometric time series methodology); and, iv) that cohort data allow joining information from different sources as long as this information refers to the same cohort.[4] Apart from the limitation of not being able to describe dynamics within the cohorts, the method proposed by Deaton presents another disadvantage. If the key variable is measured with positional statistics (means or medians), the results for a model that includes this variable will lead to erroneous conclusions due to the ecological fallacy (King 1997). In other words, a cohort that has a mean of "k" on a certain variable may be composed of two sub-populations with extreme values on that variable, but since we are working with aggregates, the whole cohort is represented by the value "k".

The method proposed by Deaton (1997) supposes the use of an Ordinary Minimum Squares model (OMS) to estimate cohort, age, and period effects in variables such as individual income, household income, consumption, and savings. Although it suggests

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[4]   For example, information on hospital releases provided by the Costa Rican Social Security Fund can be combined with information from the Household Survey, as long as the same cohorts are defined.

the possibility of using different trend variables to capture these effects, this researcher carried out the decomposition using a series of dichotomic variables ("dummy variables") for the cohort, age, and period. Nevertheless, the problem arises that the cohort can be understood as a linear combination of age and period. For this reason, Deaton proposes not only excluding two of the variables to eliminate the perfect collinearity between the dummies, but also to standardize one of the effects, in this case period (Deaton 1997). This standardization is such that the effect of time (or period) captures the cyclic fluctuations over the years. To achieve what is proposed, he uses the following formula:

$$d_t^* = d_t - [(t-1)d_2 - (t-2)d_1],$$ (1).

where d_t^* is the new "dummy" for each year and d_t is the original dichotomic variable (equal to 1 at time t, and 0 the rest of the time), both at time t. This standardization makes the period effect orthogonal to a trend variable. Then to find time, cohort, and age effects, we ran a regression with all cohort dummies (except one), all age dummies (except one), and a set of T-2 year dummies, where T is the total number of years (or surveys available).

Since this model seeks to analyze poverty (which has a nominal scale) and not variables such as those Deaton analyzed (which are interval scale, such as income and consumption), decomposition was not carried out with a Least Squares model, but rather using a logistic regression with grouped data.[5] We felt this model would better describe proportions of poor than other models for discrete variables, such as a Poisson regression or a negative binomial regression.

After calculating the basic model with decomposition, several variants were run. The first of these was to separate the analyses by gender. We preferred to calculate two different models instead of a single one, with the explanatory variable gender, because we considered that the behavior of the proportion poor varied between males and females, particularly with regards to the age effect. We also added a series of explanatory variables that help to explain the evolution of poverty in Costa Rica over the last 21 years. The most important variable considered was education. Different theories, especially those centered on return on investment in Human Capital, link levels of education with the probability of being poor (Thurow 1967, O'Neill 1995). Here, we attempt to show that average population educational levels have been increasing and how, as could be expected, this has occurred among cohorts born more recently, so that this increase in average education partially explains the cohort effect. The other three variables included are more related to individual lifecycle: labor force participation rate –proportion of persons aged 12 or more years belonging to the labor force-, headship rate (or proportion of heads of household in each age group) and percentage of widowhood. Economic activity, i.e., work, is an important factor for explaining differences in poverty, not only among the elderly, but also throughout an individual's whole lifecycle (Thurow 1967, Céspedes and Jiménez 1987). Economic participation is

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[5] Command: "blogit" in STATA.

low during the later stage of life (as it is during the earlier stages). With regards to headship rate, this begins low during youth and increases as males marry; among females, the headship rate is important, since Costa Rican Household Surveys have repeatedly found that single women as household heads are among the most vulnerable groups in socio-economic terms (PEN 2002a, 2002b). The proportion of widows and widowers was incorporated into the analysis since other studies mentioned previously (Ross *et al.* 1987, Holden *et al.* 1988) have found a high degree of association between women at advanced ages, poverty, and widowhood. It was hoped that proportion of widows would also explain part of the age effect and part of the cohort effect on poverty. One analytical possibility that we originally considered utilizing was to define cohorts not only by year of birth, but also by region of residence. However the problem arose of how to categorize and place migrants, since a person that lived in the Chorotega Region in 1981 and the Central Region in 1987 could not be assigned to a specific cohort without considering in the model some measure for leaving and entering cohorts, not only due to migration, but also through differential cohort mortality. Regional variables were not included in the model, although region of residence was used in a descriptive analysis towards the end of the paper to explain the phenomenon better.

It is important to note that not all surveys available on the CCP website have all of the required variables. Thus, we decided to effect the analysis not with all of the years, but with the surveys for every third year, beginning in 1981, a year during which the economic crisis had not yet translated into increases in the percentages of poverty. As a result, we used surveys for 1981 and 1984 (first program) and those for 1987, 1990, 1993, 1996, 1999, and 2002, for a total of eight periods. Among these, 1984 did not have the variable on educational level, so we imputed it using an average from the surveys for 1983 and 1985. The same strategy was used with the proportion of widowhood variable, since the surveys from the 76-86 program did not contain this information. The decision to take the surveys for every third year has another advantage. Deaton (1997:p.121-127) argues that inferences made with the model have an assumption that the surveys are independent one from another. Nevertheless, in Costa Rica, Household Surveys are not strictly independent one from another, because each one of the two programs has started with a master sample and within each segment selected by Probability Proportional to Size (PPS), during the periods 1976-1986 and 1987 – 1994, 50% of the clusters were rotated. This means that approximately 50% of the households interviewed were the same in two successive interviews. If we take the surveys every third year, the probability of interviewing the same households is negligible, respecting the assumption of independence, or at least reducing the inter-class correlation among surveys. The problem does arise, however, with the last three surveys, since after 1995, only 25% of the sample was rotated. In the end, the decision was made to go with every third survey and not every fourth year, since the latter would also reduce the number of surveys available for analysis, affecting analytical power as well (in terms of the number of cohorts).

Results

Before showing the estimates for age, cohort, and period effects, it is important to observe the evolution of poverty over time, as well as that of those groups with high percentages. Figure 2 presents the time series for percentage of poor households between 1980 and 2002. Note the peak in 1982, which coincides with the effects from the socio-economic crisis. In addition, the almost flat trend after 1994 is also visible. Table 1 presents, for 2002, the percentage of persons living in poor households within special demographic sub-groups: the population living in female headed households, those less than 12 years of age, males 12 to 17 years of age; females 12 to 17 years of age, and individuals aged 65 to 74 years and 75 or more years, and separated by gender. As can be seen, among these group, the elderly over 75 years, females 65 to 74 years, and children less than 12 years of age are the groups with the highest probability of living in a poor household, since their respective proportions exceed 30%.

Figure 3 presents the evolution of proportions poor between 1980 and 2002 by cohort, named by year of birth (panel A), as well as the evolution by age of the proportion poor, also for each cohort (panel B). To simplify the figure, cohorts are grouped in 5 categories: those born before 1921 (80 or more years in 2000), those born between 1921 and 1935 (aged 65 to 79 years in 2000), those born between 1936 and 1950 (aged 50 to 64 years in 2000), those born between 1951 and 1965 (aged 35 to 49 years in 2000), and those born after 1965 (aged 15 to 34 years in 2000). The jump caused by the economic crisis of 1981-82 dominates the figure and during this period, all cohorts present a proportion poor between 55% and 65%. Nevertheless, it is also clear how the lines of the older cohorts (those born before 1935), are consistently above those of the more recent cohorts. This figure does not directly express the cohort effect, which is confused with the age effect. For example, the youngest cohort line (whose individuals were at most 15 years of age in 1981) has the highest point in the figure for 1982, but by 2002 (when the cohort was between 15 and 36 years of age) shows the second lowest proportion among the groups. Part of this decline is due to lifecycle, as individuals gather more experience or education (or both), their probability of living in poor households declines; part of the decline may also be explained because these individuals were able to benefit from economic and social policies of the 80's and 90's (emphasis on education, diversification of products, etc.), to a greater extent than other cohorts. According to panel B of Figure 3, lines for the younger cohorts are consistently lower than lines corresponding to the older cohorts, when they were observed at the same ages. Thus, around 20% of the individuals born after 1965 were poor when they were 25 years old, while around 34% of the individuals born between 1951 and 1965 were poor at the same age. This difference expresses cohort and period effects, if we keep in mind the fact that a cohort effect exposes characteristics of a generation at a certain age at a specific moment in time, since some of the individuals born between 1951 and 1965 were 25 years old precisely at the peak of the economic crisis of 1981-82.

What characteristics have the cohorts, which we consider elderly in 2002, had over the last two decades? Table 2 shows a summary of the particularities of three cohorts of males and females (those from 1906-1915, 1916-1925, and 1926-1935) over time, similar to the indicator corresponding to the country as a whole (boldface lines). It

includes the independent variables, which will try to explain behavior of the effects. It is worth noting that the average level of schooling throughout the country has increased from 6.4 years to 7.5 years between 1980 and 2000. Nevertheless, as was explained above, the years of study of the older cohorts remain relatively constant during the period studied, with averages of less than 5 years. Fluctuations observed are due to small sample size and also possibly due to differential mortality by educational level.[6] It can also be seen that the proportion of widowhood has an approximately stable trend over time, particularly among males. The greater proportion of widows than widowers also reveals the well-known phenomenon of male over-mortality. The headship rate is high among males, but its decline is palpable in older cohorts. Among females, the headship rate increased between 1980 and 2000. Among older cohorts, the increase may be linked to widowhood. With regard to labor force participation, as could be expected, participation in work declines for the older cohorts. Furthermore, similar to headship rates, the last quarter of the 20th Century saw an increase in female labor force participation.

As we explained in the section on methodology, we sought to estimate period (which expresses primordially cyclical components), age, and cohort effects. For illustrative purposes, Figure 4 contains a set of graphs presenting these calculations, using the annual series from 1987 through 2002, together with that carried out with the three-year data.[7] As was expected, the period effect, shown in panel B, is dominated by the socio-economic crisis of 1981-82. The three-year series does not capture the increase in poverty levels in 1991, since this datum is not included. We also hoped that after 1993, a practically horizontal line would be visible, coincident with the stagnation of the percentage of poor shown in Figure 2 (Barahona Montero 1999b). To the contrary, we find a slight but sustained increase. This finding makes us think that if the effects of population composition by cohort and age were neutralized, we would be seeing an increase in the proportion of Costa Ricans living in poor households. Additionally, the figure corresponding to the annual series clearly illustrates how the political economic cycle has a bearing on the general poverty level seen each year; it is worth noting that these cyclical variations present a lesser magnitude during the Figueres Olsen and Rodríguez Echeverría administrations.

The age effect is found in panel A of Figure 4. In order to observe its behavior, we must keep in mind that limited data availability means the intermediate cohorts (born in mid-century) dominate the calculations of the effect. Thus, for example, an individual born in 1950 is represented in the series by individuals aged 31 years in 1981, 34 years in 1984, and so forth, through individuals aged 52 years in 2002. On the other hand, a person born in 1975 is not represented in the data from 1981 through 1990 (the sub-sample that would represent him/her was less than 18 years old in the respective surveys). Among males, the age effect on poverty has a more pronounced reduction

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[6]   It is noteworthy that when comparing educational levels between 1980 and 2000, the averages in 2000 are lower. This would imply that among the members of these cohorts, those that had a higher mortality were the more educated. Nevertheless, there are no data to justify this interpretation. The variations may also be due to small sample sizes for these sub-populations.

[7]   As was explained above, in later analyses the three-year series were preferred to maintain the assumption of independence of the observations among the surveys.

than among females. There are no discrepancies in the figures for females in the yearly and three-year series. Among males, to the contrary, the age effect is less pronounced in the annual series than in the three-year series (in other words, the curve is flatter in the annual series). In addition, the form of the figure is quite eloquent: there is a high probability of being poor between 18 and 29 years of age, but after age 30 (approximately) the proportion poor declines. This can be explained because we would expect average individuals to obtain more income as their labor experience increases. However, after age 60 (an age close to the modal retirement age), the proportion poor again increases. Is this a product of the quantity and type of data available? This explanation is possible, since the observations corresponding to those over 65 are almost exclusively from the oldest cohorts. Further below, we will try to explain this phenomenon using a series of independent variables in the model.

Section C of Figure 4 describes the cohort effect; the cohorts are named by date of birth. Once again, no discrepancies were seen between the annual and three-year series for females, but among males, the effect is stronger (i.e., the curve is steeper) with the three-year series than the annual series. In general, the figure illustrates a behavior that declines in an essentially linear manner, which means that the members of a cohort have, on the average, a higher probability of being poor than those born a year later, so that it could be argued that high levels of poverty among Costa Rican elderly can be explained principally as a cohort effect, and also partially as an age effect, as shown in Figure 3. Nevertheless, the line corresponding to the cohort effect has an obviously greater incline than the age effect after age 60.

Table 3 provides tests of hypothesis to evaluate if the calculated effects are significantly different from zero. Since the effects were calculated with dummy variables, there is no slope value with its respective t test; rather, we have used an F test to compare models. This way, the hypothesis test corresponding to the age effect is a test that compares the logarithm of the likelihood of the model with the dichotomic age variables, against the logarithm of the likelihood of the model without them. As can be seen, the effects have an impact on the model's explained variance. It is important to remember also that the data based on the three-year series respect the assumption of independence for the observations among years, so these test results are statistically more reliable. Next, with the incorporation of independent variables, we will also analyze how the above figures change.

The independent variables incorporated are the same ones that are summarized in Table 2, plus, implicitly, the gender variable. The model was estimated using three-year data for the reasons indicated in the methodological section. Figure 5 presents the original cohort effect for male and female populations, as well as the cohort effect after controlling for the independent variables in the following order: average years of schooling, an interaction between the years of schooling and the year 1984, proportion of the cohort in the labor force (participation rate), headship rate, and percent of widows/widowers in the cohort. The lines in the graph represent the estimated effect with variations in the original model, to which were incorporated a new additional variable each time. Therefore, the first is the original model; then the original model with

average schooling; the third is the original model with schooling and the interaction of schooling with the year 1984; and so forth. First of all, the descending curve means that the older cohorts have a greater probability of living in households with incomes under the poverty line. Furthermore, as can be seen in the figure, education has the greatest impact on the cohort effect, but only by incorporating an interaction between the mean years of education and the year 1984 (the closest year after the 1981-82 crisis) since not only is the slope of the second line gentler than the first line, but the curve essentially varies around zero. All of the other lines overlap with this third line, which means that the average level of schooling is the one with the greatest impact on the cohort effect on poverty among males. Among females, the curve's behavior is somewhat strange. First of all, by adding average years of schooling to the model, the curve moves towards the zero axis, as it did among males. However, when the proportion of females in each cohort participating in economic activities is added, the curve moves back up and overlaps the original curve. In addition, when the headship rate is added to the analysis, the live moves further up from the position of the original line. This does not imply that education does not explain the cohort effect on female poverty, but it explains it partially, because when controlling for labor force participation and household headship among females, the cohort effect is encountered once again. In other words, there is evidence that another variable not taken into consideration in the present analysis –since it was not available- might be able to explain why the older cohorts have a greater probability of being poor than more recent cohorts. These variables could be all those associated directly with the household (number of wage earners, residential arrangements, etc. which, as mentioned above, could not be included), as well as more historical variables (labor history), which are not captured in the Household Surveys. It may also be a model identification problem, since the independent variables may be strongly interrelated.[8]

The same procedure described above was followed to analyze age and period effects. Figure 6 shows the changes in the age or lifecycle effect for males and females. The graphs of the effect without any independent variables have a "U" shape, accentuating the importance of intermediate ages for reducing the probability of being poor. In the case of the males, education causes the curve to move down to zero, which means that part of the age effect disappears when controlled for education. But when incorporating the percent of male headship, the line again moves downward. In the female case, mean years of schooling never make the age effect disappear, and just as in the male case, upon incorporating the headship variable, the graph moves down. In general, we expected that a typical lifecycle variable, being head of a household, would help explain a possible age effect. Nevertheless, just the opposite occurred: by controlling the effect

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[8] The problem of over-identification of the model may occur through adding two independent variables that, among females, are highly correlated between themselves, and which at the same time have high correlations with the cohort effect on the probability of being poor. The cohort effect is estimated with regression coefficients, and these are sensitive to a high correlation of their respective variable with other independent variables; in other words, a problem of high multi-collinearity, which is not affecting the standard errors, since the sample size is quite large. In Table A2 of the Appendix, it is clear that among males, other than the effects of age, cohort, and period, only education has a statistically significant coefficient on the probability of being poor. On the other hand, among females, both education and the rate of household headedness have significant coefficients. The interrelationship among poverty, heading a household, and education over time and the life cycle are worthy of a more detailed analysis than the one offered in this paper, given the proposed objectives.

of the headship rate on the probability of being poor, the graphs show that as one ages there is less probability of being poor. If one compares Figures 5 and 6, this might be trying to say that, among the female population for certain ages, the prejudicial effect of belonging to an elderly cohort is compensated by the "protective effect" that age would have. Thus for example, for a woman, being 75 years old implies that her "chances"[9] of being poor decline by 85% (1-e$^{-1.93}$) with regard to a person aged 18, but having been born in 1927 implies that her "chances" of being poor would increase almost five times more (e$^{1.75}$) with respect to a person born in 1984. In net terms, the chances of being poor due to being around 75 years of age and having been born in 1927 are 16% less (e$^{0.18}$) than the chances that a female has of being poor since she is 18 years old and was born in 1984. On the other hand, according to the results, for certain combinations of year of birth and age, the age and cohort effects among the male population are not compensated, but are accentuated (downwards); thus, for example, the "chances" for a male aged 75 years born in 1927 of being poor are 45% lower than those of a male aged 18 years born in 1984, controlling for the differences in years of education. Figure 7 presents the variations in the period effect that arise when the independent variables are controlled. These have scant weight and are very similar among males and females. In view of the fact that the period effect is dominated by economic cycles, it was improbable that the independent variables selected –basically characteristics of the individuals- would affect them. In the future, an analysis may look at macroeconomic (inflation rate, colon devaluation rate) or political variables (dichotomic variables that measure the different years of presidential administrations), to better understand the observed behavior.

Up to here we have the following preliminary findings:

- ? The period effect is primordially influenced by the crisis at the beginning of the 80's and if one uses an annual series, the political-economic cycle also raises its head.
- ? The percentage of persons as heads of household in each cohort and year has an impact on the age effect in a direction contrary to what was expected, and this may have one of two interpretations: either, especially among females, there may be an "omitted variable bias", i.e., the fact that certain information is being left out of the analysis (since it wasn't available) that could explain the age effect in the female population, or, on the other hand, there is a problem of over-identification in the model.
- ? There is a clear cohort effect, whereby the members of older cohorts have a greater probability of being poor. This cohort effect is almost completely explained by the fact that the older cohorts have less years of study than the more recent cohorts, especially in the male population.

Other authors (e.g., Céspedes and Jiménez 1988, PEN 2002b) have already indicated that in general terms for the whole population, educational levels are tightly linked to the probability of being poor. If the cohort effect can be explained (even just partially) by the differences in educational levels among generations, it is valid to ask ourselves what

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[9] "Chances" here means the same as "odds".

characteristics of the elderly currently intervene in this relation. As was already repeated before, a cohort effect describes how a certain generation experienced a series of events in time given the common age shared at the time these events occurred. The elderly cohorts at the beginning of the 21st Century had the experience of being youths during the Civil War of 1948 and of having witnessed the institutional changes that characterized Costa Rica during the second half of the 20th Century. Nevertheless, the fact that they have been witnesses to these changes does not exactly mean that they have benefited from them directly. The evolution of the Social Security institutions was a fundamental factor for achieving high levels of life expectancy (and general health) among Costa Ricans. This benchmark also allowed a strengthened retirement pension system that ensures income to Costa Ricans at the end of their working life. However, at the beginning of the 70's there was still an important proportion of the population without insurance. According to the 1973 Census, 60% of adult males and females were not covered by social security. According to the 1984 Census, these percentages had dropped to 30% for males and 27% for females. The 2000 Census and the Household Survey for the same year[10] coincided with figures of 21% and 15%, respectively. Tables 4 and 5 present data that the cohorts born prior to 1936 have insurance coverage similar to that for the whole country in 1973 and 1984. By 2000, less than 9% of these cohorts are not insured. How did they obtain their Social Security? Using data from the 2000 Household Survey, we can see that a large proportion of these generations (a quarter of the females and a fifth of the males) have obtained coverage from the insurance called the Non-Contributory Regime (*Régimen No Contributivo,* RNC) or under the one known as Insured on Public Account. The RNC is a system under which the elderly in poverty, their dependents, and the disabled have the right to health services from the Costa Rican Social Security Fund, and also receive a subsidy coming from 20% of the resources of the Social Development and Family Allocation Fund (*Fondo de Desarrollo Social and Asignaciones Familiares*, FODESAF) and from the 5% contribution by employers on wages paid (Córdoba Herrera 1995, Martínez-Franzoni and Mesa-Lago 2003), as well as benefits generated by the Electronic Lottery (República de Costa Rica 1994). Insurance on the Public Account is another class of insurance aimed at the indigent population having no other type of insurance. In contrast to the RNC, beneficiaries do not receive any type of subsidy.

The intrinsic characteristics of the RNC aid in explaining its relationship to a kind of perpetuation of poverty. The subsidy paid to the beneficiaries in January 2003 was 13,800⁰⁰ colons for the elderly, single mothers and indigent and 81,200⁰⁰ colons for persons with cerebral palsy. "According to the Worker Protection Law, the RNC pension should not be less than 50% of the minimum old age pension under IVM[11] [Disability, Old Age and Death Regime], however, in January 2003 the RNC pension was 37% of the minimum IVM pension" (Martínez-Franzoni and Mesa-Lago 2003: p.31). As can be seen, the poor elderly are the ones receiving this subsidy, but the subsidy is so low that if it is the main household income, the household will remain poor. The 2000 Household Survey confirms this, showing that 54% of the Costa Ricans age 65 or more with a RNC

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[10] This section of the paper uses the 2000 Household Survey instead of that for 2002, in order to have a certain degree of temporal comparability with the 2000 Census.

[11] Disability, Old Age, and Death Regime (Régimen de Invalidez, Vejez y Muerte, IVM) under the CCSS

pension live in poor households. It is extremely important to acknowledge that one of the major benefits of this regime is to offer the possibility of receiving free medical attention, a core service for the elderly and disabled. However, this does not hinder us from stating that in the area relating strictly to income, the households with this benefit will remain below the poverty line if this subsidy continues to be their main source of income. How does this fact relate to education? According to Table 5, in 2000, while one-quarter of the elderly over 64 years of age, with incomplete primary or less education receive a pension from the RNC, the proportion drops to 6% among those that completed sixth grade or higher. Furthermore, in 1973, according to the Census, among those born between 1906 and 1935 (who were between 65 and 94 years of age in 2000), 61% of those with less than sixth grade education did not have Social Security, but 57% of those with a better education were not insured. In 1984, these proportions were equivalent to 26% and 19%, respectively. In summary, what we want to argue here is that the high proportion of RNC pensioners (and those insured on the Public Account) among the current elderly in Costa Rica apparently is related to the high proportion of non-insured from this cohort in the past, particularly during the decade of the seventies, since it showed that the individuals with less education had a lower probability of being insured in the past and of having an RNC pension in the present.[12] From a methodological point of view, we expected to include the variable on insured condition in the analysis to estimate the age, cohort, and period effects, but the databases from surveys prior to 1991, available off Internet at the CCP website did not include that variable.

This relationship between non-insured status in the past and being insured under the RNC in the present is even clearer if we disaggregate by regions. Although it is true that Table 6 does not take into consideration the possible migration of individuals from the periphery towards the Central Region, it clearly shows that the Central Region has the lowest proportion on non-insured compared to the rest of the country in 1973 and in 1984, and that the proportions of elderly with an RNC pension and of elderly living in poor households are greater than in the peripheral regions. Insofar as the question on insured status in the 2000 Census does not separate the RNC pensioners from the rest, the source for these estimates was the Household Survey for 2000. Given the limitations imposed by sample size, the relation between regions, RNC, poverty, and educational level is shown in Figure 8, dividing the country into only two regions, Central Region and Rest of Country. This graphic is eloquent indicating how much higher poverty is among the pensioners under the Non-Contributory Regime, particularly in peripheral regions.

But RNC pensions are not the only factor that could be intervening in the relationship between education and poverty among the elderly. For the year 2000, among those born before 1935, 29% of those with an IVM pension lived in households with income below the poverty line. In addition, among these pensioners, 21% of those with incomplete primary education or less were poor, while only 10% of those with sixth grade completed or more were poor. The fact that pensioners from the IVM regime have

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[12] The argument is based on the assumption that a majority of those who were direct insured in 1973 and 1984 had the right to a pension under the Contributory Regime, which is substantially greater.

income below the poverty line is related to the low income they received when they were working. For example, we can compare the average primary income received in 1991 by the members with direct social security in the male cohort[13] born between 1926 and 1935 (i.e., those that were still working, but at ages close to retirement). The average income was lower among the less educated (26,679°° colons) with respect to the more educated (36,071°°). If we observe the average amount of the pension received by this same cohort in 2000 (in constant 1991 colons), we can see how the relationship between the educational level and income is maintained: those with less than sixth grade received 21,354°° colons, while those with sixth grade completed or more received a pension of 49,480°°. Education itself did not make these cohorts have a lower income, but intervened so that a higher proportion of those that had not completed primary had low-skilled occupations with which they earned low incomes. The sub-sample is not large enough to make a detailed analysis of their occupational structure, but as an example, among the less-educated males in the 1926-1935 cohort, the percentage of agricultural employment –which on the average earns lower incomes than other occupational groups (Céspedes and Jiménez 1988)- in 1991 was substantially higher (58%) than among the more educated (15%).

Discussion

By estimating age, cohort, and period effects on the proportion poor, it was possible to show that the proportion poor among the elderly can be described not only as an age effect (those individuals at older ages have a greater probability of being poor than those that are younger), but principally as a cohort effect (the older cohorts have a greater probability of being poor than the more recent cohorts). The fact that the slope of this cohort effect is so pronounced, as shown in the graph, means that the older cohorts have been falling progressively into disadvantage as Costa Rica has changed. The fact that mean educational levels explain the cohort effect, at least among males does no more than confirm the argument wielded. The Costa Rican Benefactor State promoted education as a mechanism for progress during the second half of the 20th Century, and the more recent cohorts have benefited more from this educational incentive. Costa Rican elderly at the beginning of the 21st Century had fewer opportunities to increase their educational level, so that during the years prior to their departure from the labor force (due to formal or informal retirement), those less educated had incomes that dragged them into poverty. Furthermore, the fact that this cohort effect is explained by a variable as structural as mean years of education provides further evidence that the elderly form a typical group of what can be labeled with the term "hard-core poor". In spite of the fact that no longitudinal information is available to corroborate the argument, the data lead us to believe that this population group has remained poor over time, instead of being a group that falls into and out of poverty according to economic fluctuations, as may be the case of younger unemployed workers, who were poor before entering the labor market, but as soon as the economy allows them to find work, they are able to climb out of their situation of poverty. To affirm

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[13] The male cohorts were selected due to the fact that among the female cohorts born during the same period there was low labor force participation.

that these elderly represent "hard-core poverty" does not imply that the future elderly in Costa Rica will continue to be so, since the monotonic form of the decline in the cohort effect could lead us to believe that insofar as the adults in intermediate ages, who did enjoy the benefits of the social and economic advances in the second half of the century, enter the classification of elderly, poverty among the elderly could begin to decline. What the proposition does imply is that part of the stagnation seen in recent years may be due to an inability of certain groups, such as the elderly, to cease being poor when the economic situation would allow it, at least temporarily. This inability may be related to characteristics acquired at early ages, and which change little over the years, so they can be described as cohort effects. The data also seem to show that these cohorts were particularly affected by the economic crisis of 1981-82, and that possibly this condition of poverty has dragged along a significant number of them for two decades.

It was also seen that part of the relationship between education and poverty among the elderly can be explained by the differential access that they had to one of the most important benchmarks in Costa Rican social history: the right to a retirement pension. The 1973 Census showed how more than one-half of current Costa Rican elderly were not insured. In 1984, this proportion declined, but continued at a relatively high level, since one-fourth had no social security coverage. In spite of the fact that the data are not explicit, it is reasonable to surmise that a significant proportion of the persons that were not insured did not have the right to a pension from the Disability, Old Age, and Death Regime (or any of the other parallel regimes, such as the Ministry of the Treasury, or for Educators) so that one of their sources of income became the Non-Contributory Regime, financed by the social investment funds of the Costa Rican State. In addition, it was shown how the peripheral regions have a higher proportion of non-insured in 1973 and 1984, as well as a greater proportion of RNC pensioners, and that part of these regional differences can be explained because the Central Region had and still has elderly with a higher average educational level. It is important to emphasize this relationship between non-insured and RNC, since and in spite of the efforts of the Costa Rican State, more than 15% of the coming retirees (those born between 1936 and 1945) are not insured (as was shown in Table 4). Thus it seems of the utmost importance to work on forecasts that would show how vulnerable these generations would be, given their characteristics. From a methodological point of view, the cohort analysis proposed by Deaton is useful to envisage the evolution of a phenomenon over time when there is no longitudinal information. However, other social scientists have proposed other measures for the decomposition of the age, cohort, and period effects (O'Brien et al 2003, Yang and Land 2003), which could be more valuable for taking into account time lag effects (for example, what effect does the fact that a higher proportion of a cohort has worked at low-skilled occupations have on the probability of being poor 10 or 20 years later?) or macroeconomic variables that have a similar effect on cohorts (for example, wage policies, inflation, colon devaluation).

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Figure 1. Latin America: Ratio of the Proportion Poor Among the Population Aged 60 or More Years, Divided by the Proportion Poor Among the Population Aged 10 to 59 Years (Around 2000), by Country and Area of Residence.

% 60 y + / % 10-59
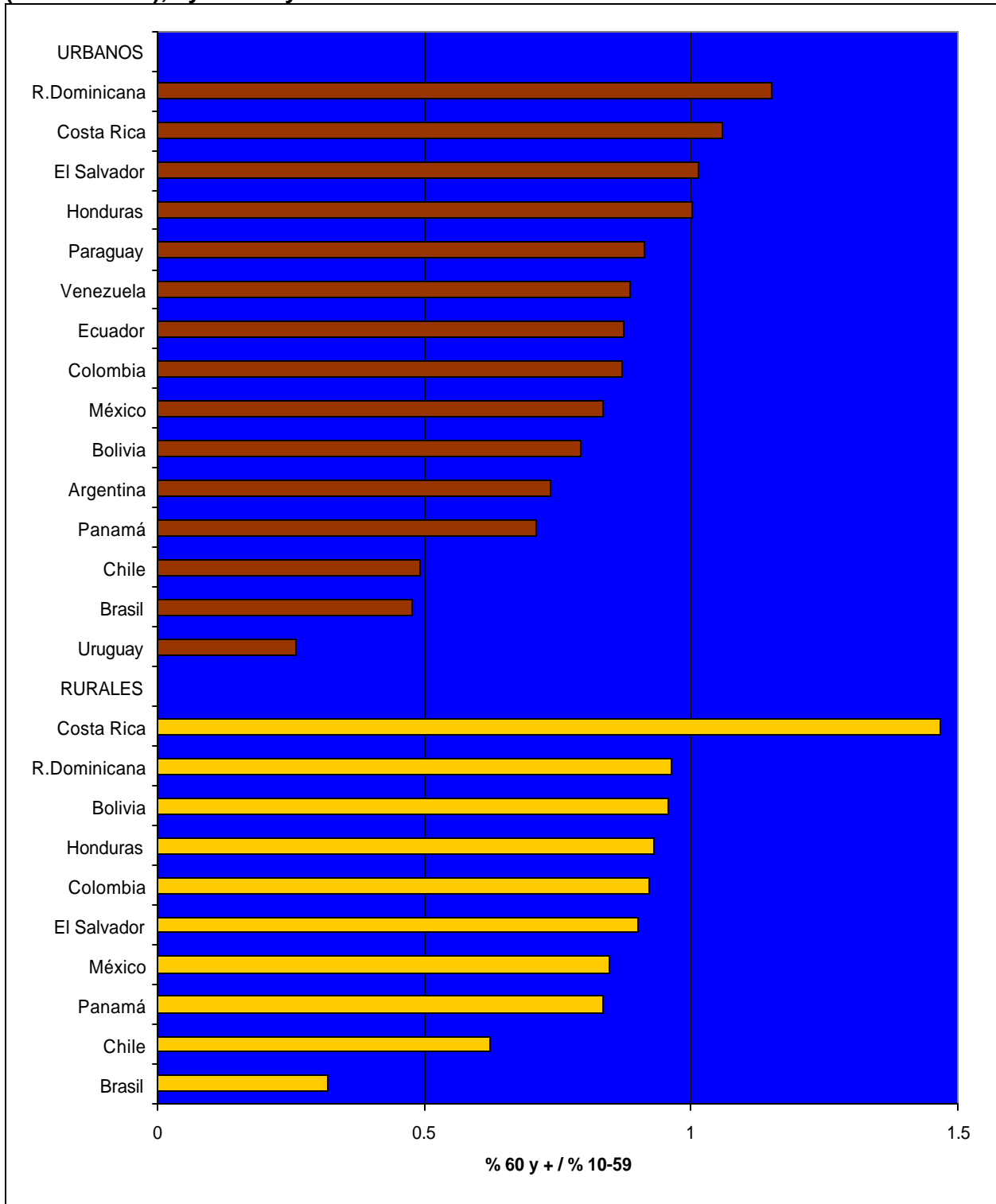
Source: Prepared by the author with data from del Pópolo (2001).

Figura 2. Costa Rica: Percentage of Poor Households, 1980-2002
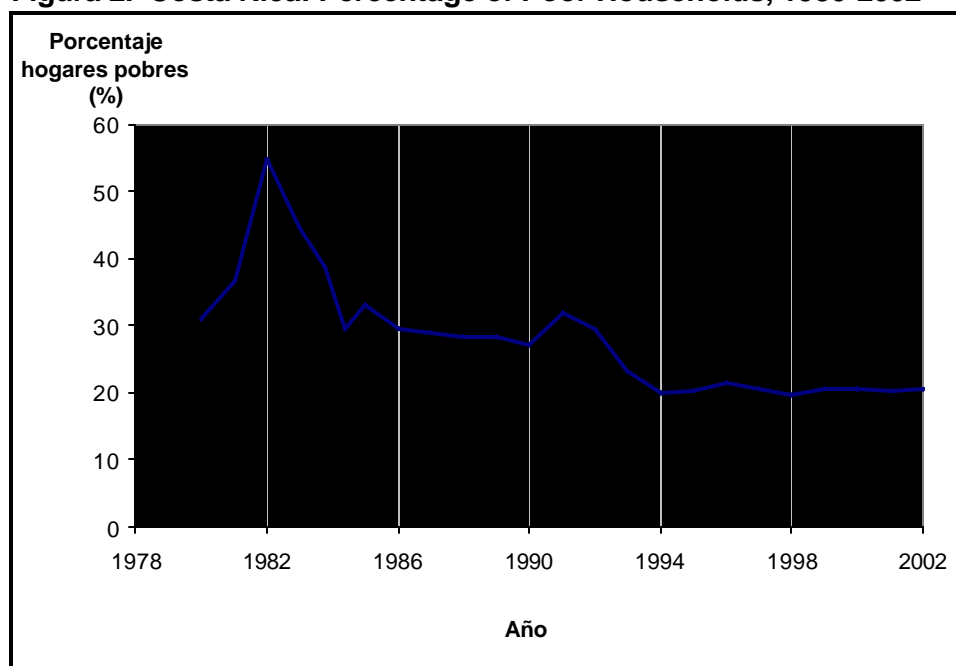
Source: Prepared by the author with data from *Encuestas de Hogares* 1976-2002

Table 1. Costa Rica: Percentage of Persons Residing in Poor Households, by Groups at Risk, 2002

Demographic groups	Sample size	Estimated population	% of persons in poor households
Total	**44,138**	**3,997,883**	**23.5**
Males	22,088	1,983,715	23.0
Females	22,050	2,014,168	24.0
Persons in female-headed household	9,366	898,692	28.2
Less than 12 years of age	3,167	937,056	31.2
Males between 12 and 17 years	3,167	273,143	30.1
Females between 12 and 17 years	2,905	256,407	26.0
Males between 65 and 74 years	727	66,999	26.1
Females between 65 and 74 years	782	76,341	31.6
Males aged 75 or more years	492	43,297	36.0
Females aged 75 or more years	514	51,852	31.9

Source: Prepared by the author with data from *Encuesta de Hogares de Propósitos Múltiples* 2002

Figura 3. Costa Rica: Proportion of Poor Persons by Cohort and Age, and by Year and Age, 1980-2002.
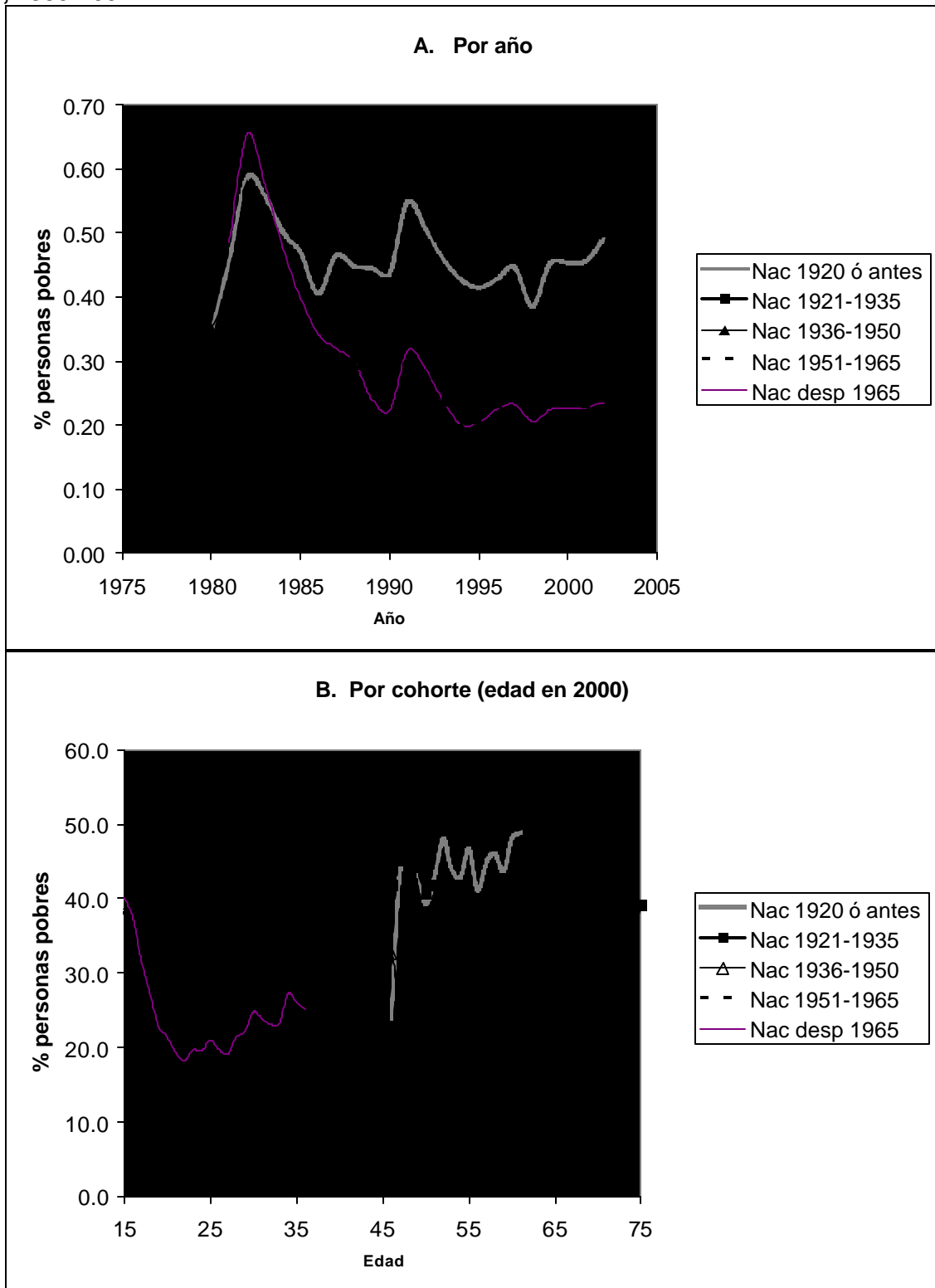
Source: Prepared by the author with data from *Encuesta de Hogares de Propósitos Múltiples* 2002
Note: The figures are not equivalent due to cohort grouping.

Table 2. Costa Rica: Characteristics of Male and Female Cohorts Born Before 1936 (Persons Aged 65 or More Years in 2000), by Year, 1980, 1982, 1985, 1990, 1995, and 2000. (Boldface values are those for the country as a whole)

Cohort characteristics	Males						Females					
	1980	1982	1985	1990	1995	2000	1980	1982	1985	1990	1995	2000
Percent poor	**28.4**	**53.0**	**34.7**	**25.7**	**25.0**	**26.6**	**29.4**	**55.7**	**35.4**	**25.1**	**26.6**	**30.3**
1906-1915	29.5	51.5	47.8	36.7	37.8	43.5	32.0	56.4	41.2	31.3	27.5	31.3
1916-1925	26.9	53.4	37.3	27.1	28.9	30.1	27.4	54.4	36.9	26.4	31.4	34.6
1926-1935	28.8	53.1	29.7	20.9	19.9	23.5	29.8	56.1	33.1	22.0	23.7	27.9
Average level of schooling	**6.4**	**6.6**	**7.0***	**7.0**	**7.3**	**7.5**	**6.4**	**6.5**	**7.1***	**7.0**	**7.3**	**7.6**
1906-1915	3.3	3.6	3.5*	2.8	3.4	2.7	3.6	3.5	3.9*	3.2	3.8	3.8
1916-1925	4.5	3.8	4.2*	3.5	4.2	2.9	3.9	3.9	4.2*	3.5	3.7	3.7
1926-1935	5.0	4.7	5.3*	4.7	3.4	4.5	4.5	4.3	4.8*	4.1	4.3	4.2
Headship rate**	**63.6**	**61.4**	**62.0**	**64.4**	**65.5**	**63.2**	**13.0**	**14.2**	**13.7**	**13.7**	**15.6**	**17.6**
1906-1915	86.0	85.1	81.9	82.1	80.5	65.9	35.8	35.5	30.5	39.6	38.9	34.5
1916-1925	92.0	90.1	90.2	89.9	83.3	78.2	27.3	31.7	30.5	32.9	37.4	39.2
1926-1935	93.3	91.8	90.8	89.6	89.6	87.1	19.6	23.7	25.6	31.2	33.9	40.5
Percent widowhood			*** 1.7**	**2.0**	**2.5**	**2.6**			*** 5.7**	**5.8**	**6.9**	**6.1**
1906-1915			* 12.7	7.7	36.4	43.2			* 38.4	38.0	79.7	66.8
1916-1925			* 5.3	4.8	20.9	20.4			* 21.0	17.9	45.5	47.3
1926-1935			* 1.9	1.4	4.6	8.8			* 3.4	6.3	20.8	31.2
Gross participation rate**	**83.6**	**83.0**	**81.9**	**82.0**	**82.0**	**79.3**	**27.0**	**29.0**	**28.2**	**33.7**	**35.0**	**37.8**
1906-1915	46.0	39.0	33.1	25.4	16.4	6.1	5.3	5.7	2.5	2.4	1.2	0.0
1916-1925	79.5	70.7	65.0	48.4	28.8	13.2	10.6	3.7	9.4	0.0	5.8	3.2
1926-1935	95.0	90.6	89.1	73.1	58.8	36.4	19.8	2.7	18.9	2.1	9.3	6.1

Source: Prepared by the author with data from *Encuestas de Hogares* 1980, 1982, 1985, 1990, 1995, and 2002
Note: *   Based on the 1984 Census of Population
          **   Population aged 18 or more years
          ***   Population aged 12 or more years

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Figura 4. Costa Rica: Age, Cohort, and Period Effects on the Probability of Living in a Poor Household, by Gender, According to Reference Period (Three-Year Periods 1980-2002 and Yearly 1987-2002).
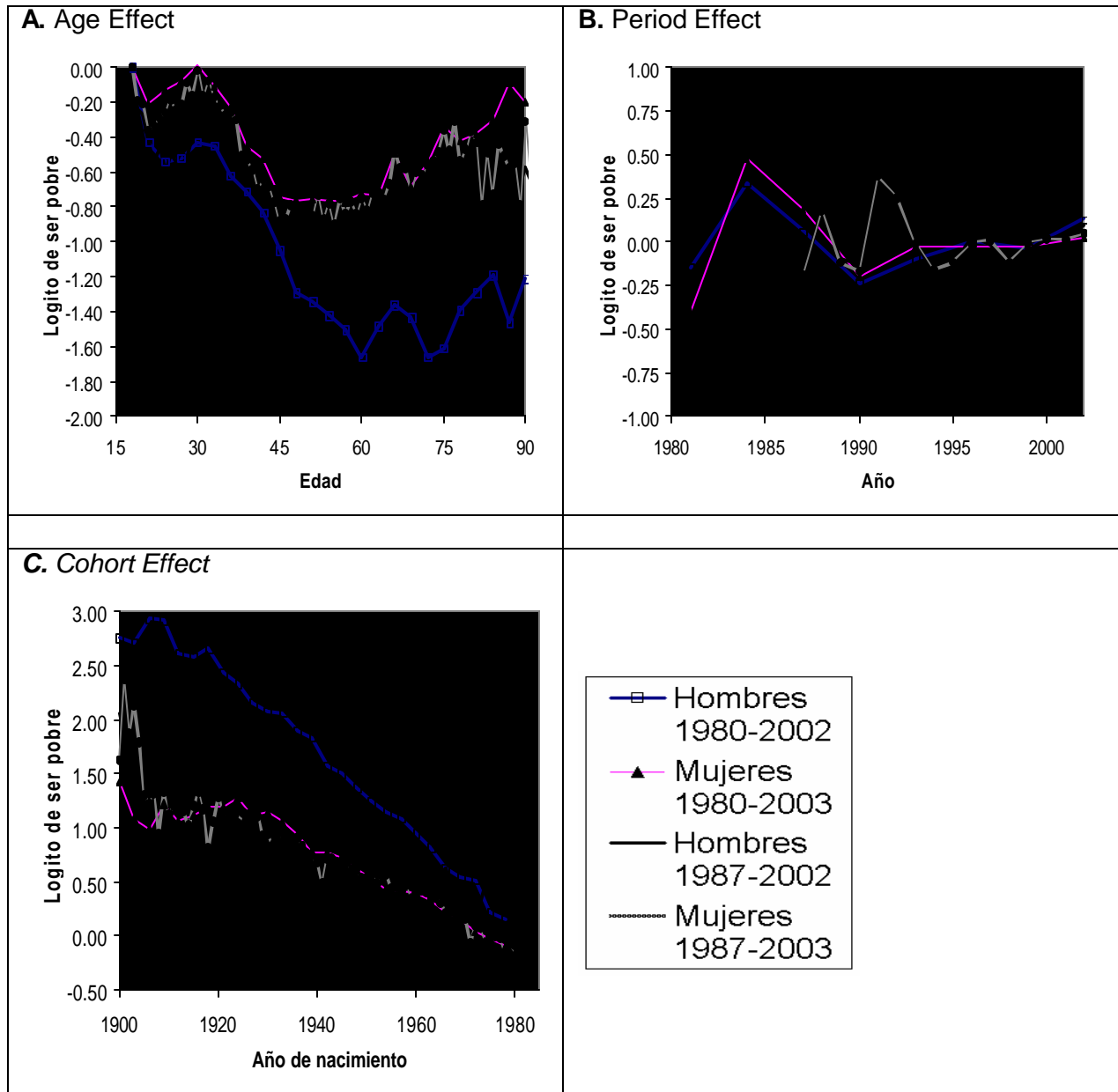
Table 3. Costa Rica: Tests of Hypothesis for Age, Cohort and Period Effects of the Percentage of Poor Persons, Based on Logistic Regressions with Data for Annual Periods and Three-Year Periods, 1978-2002.

Effect	Annual Periods		Three-year periods	
	F Statistic *	p-value	F Statistic*	p-value
Males				
Age	511.23	0.000	315.75	0.000
Cohort	273.07	0.000	91.18	0.000
Period	458.13	0.000	270.12	0.000
Females				
Age	539.72	0.000	297.28	0.000
Cohort	251.71	0.000	90.83	0.000
Period	556.23	0.000	298.46	0.000

Note: *   The Null Hypothesis of the F test is the model excluding the dichotomic variables corresponding to the effect being contrasted.

Figure 5. Costa Rica: Cohort Effect on the Probability of Living in a Poor Household, by Gender, Controlled by a Series of Independent Variables, 1980-2002.
(Measured by Changes in Logits of Being Poor.)
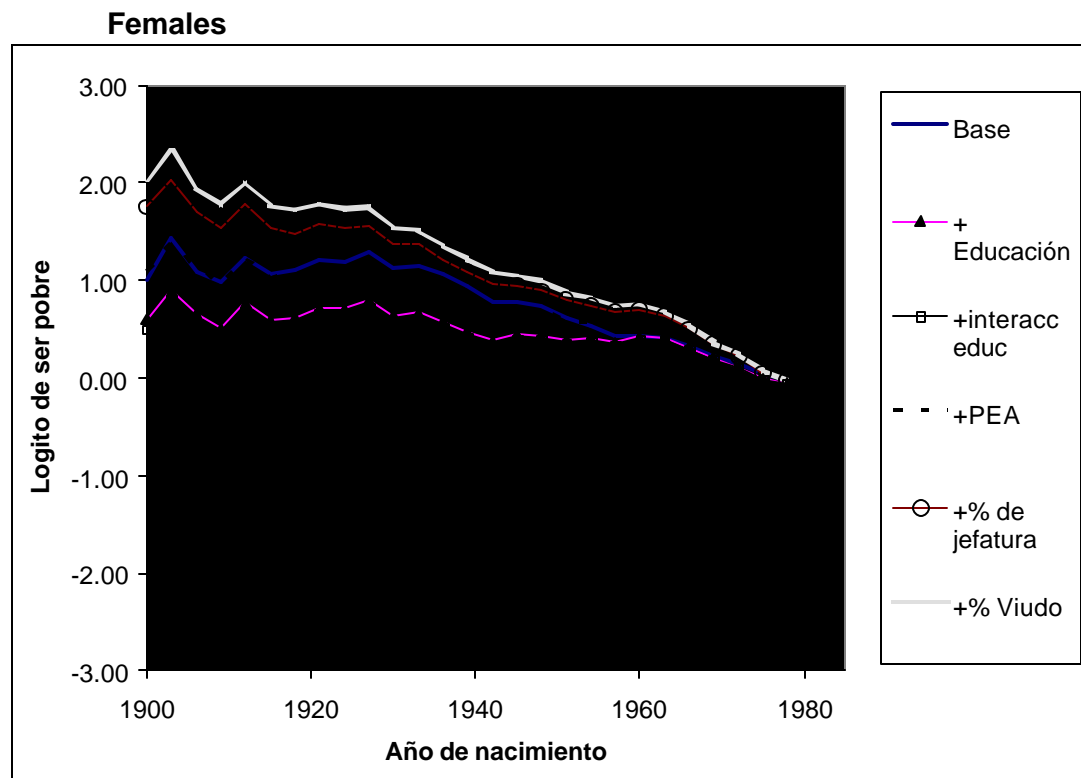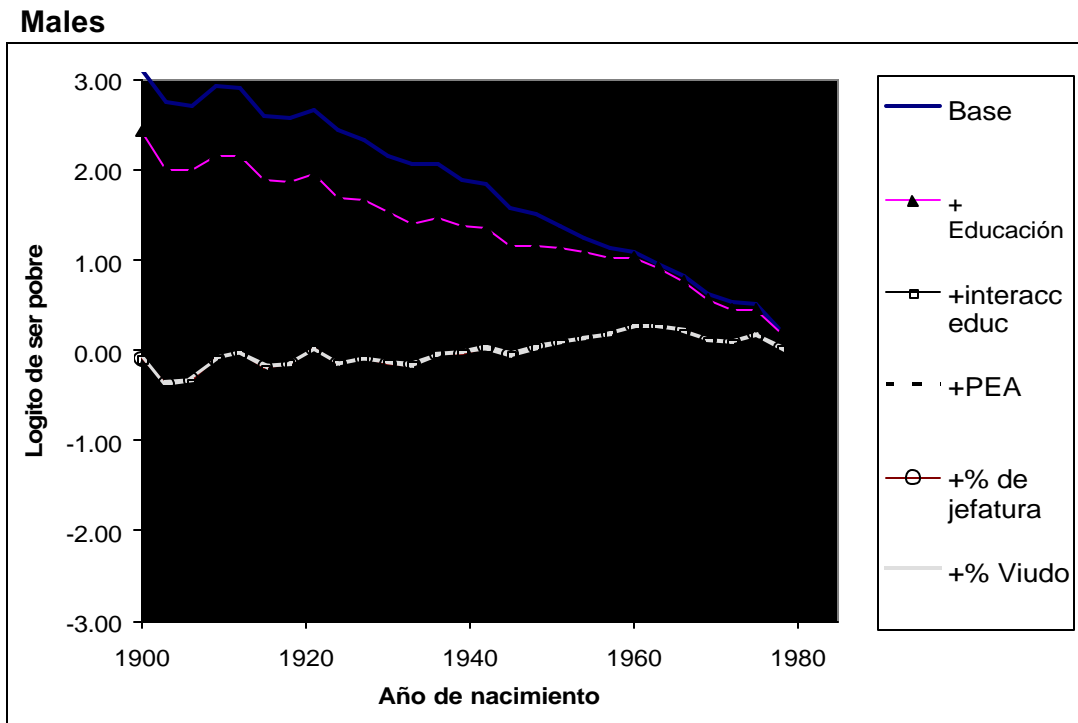
Males

Females

Figura 6. Costa Rica: Age Effect on the Probability of Living in a Poor Household, by Gender, Controlled by a Series of Independent Variables, 1980-2002. (Measured by Changes in Logits of Being Poor.)

Males

Females

Figure 7. Costa Rica: Period Effect on the Probability of Living in a Poor Household, by Gender, Controlled by a Series of Independent Variables, 1980-2002. (Measured by Changes in Logits of Being Poor.)
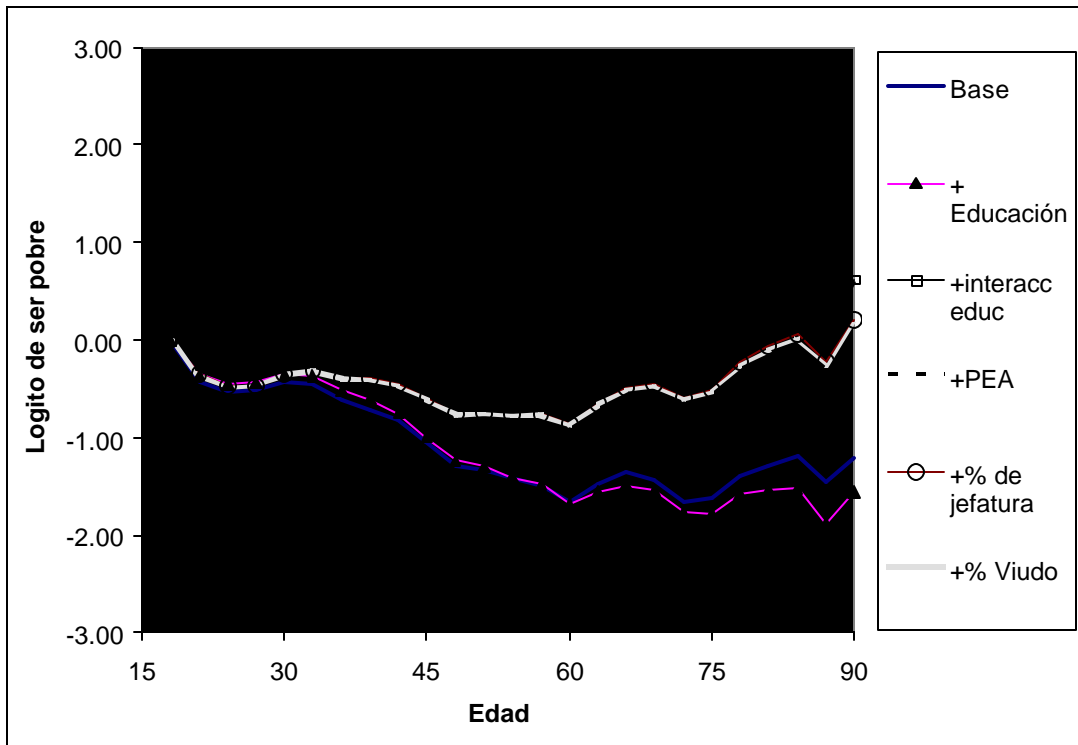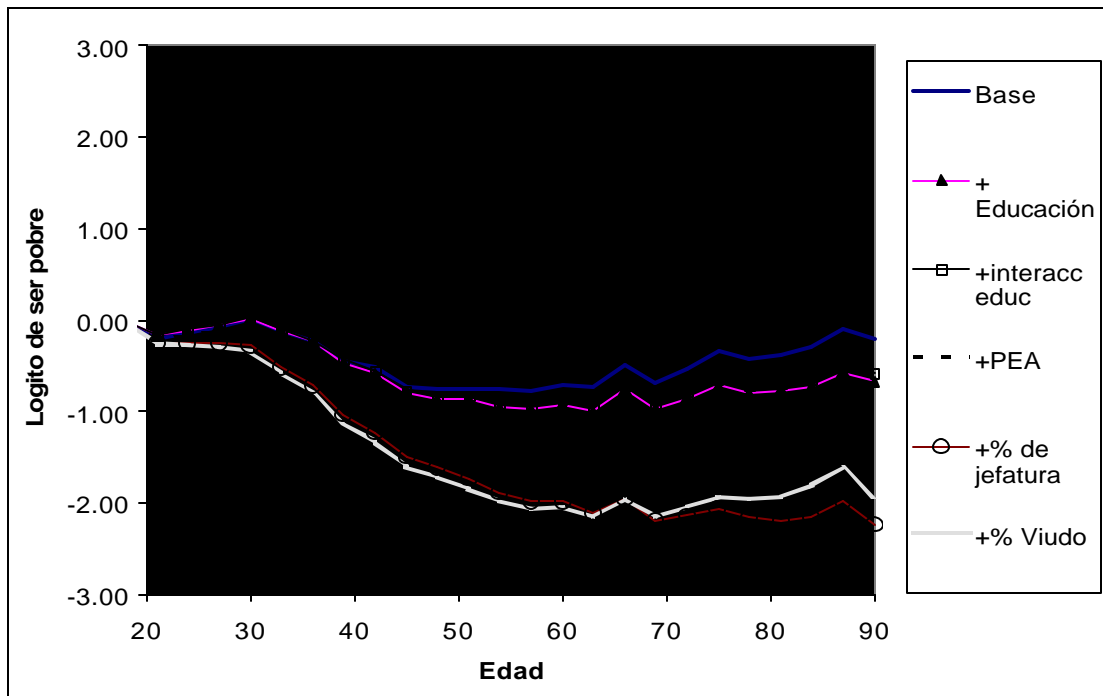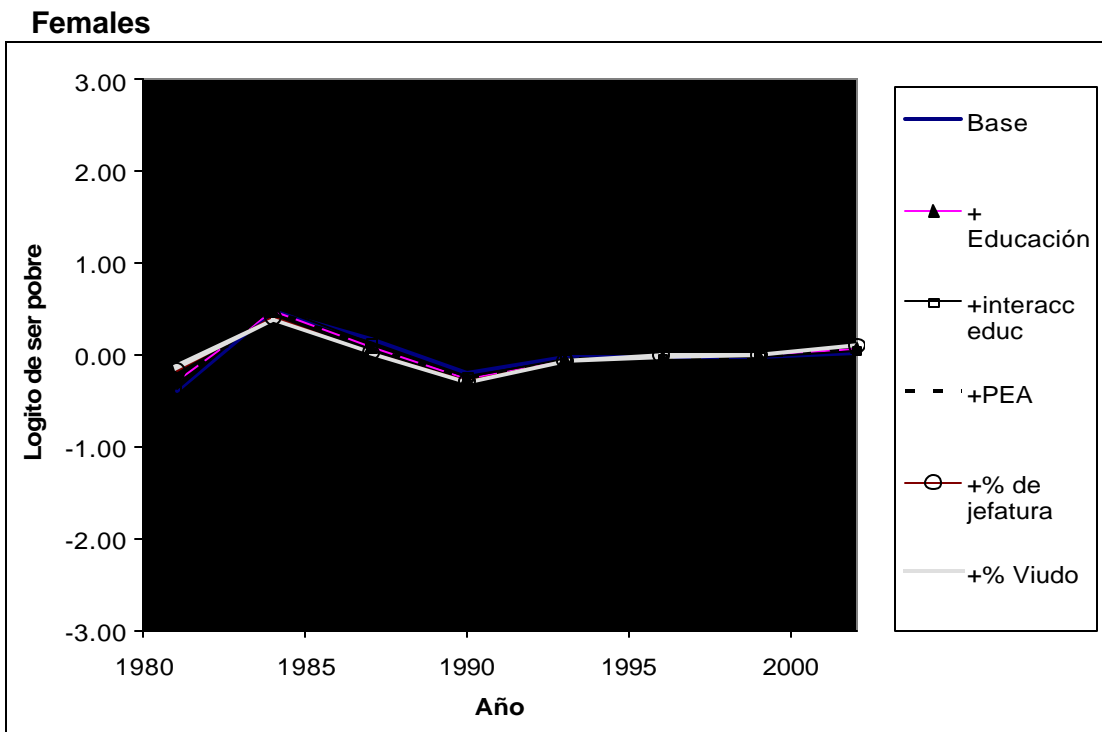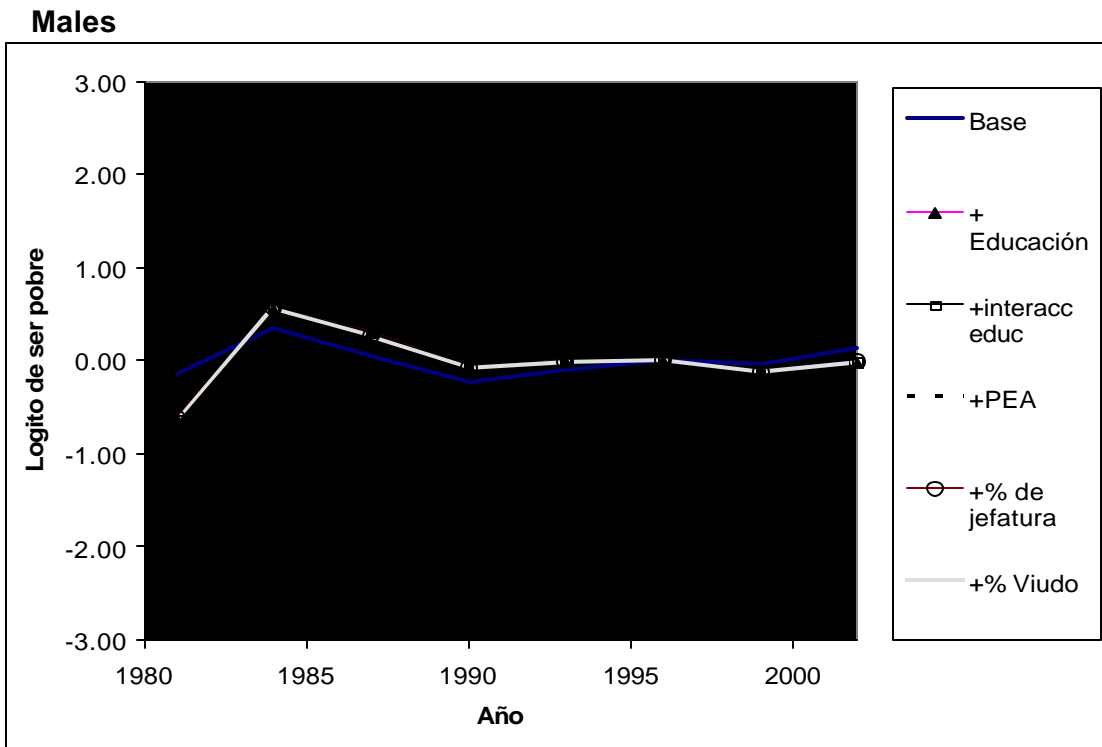
Males

Females

Table 4 Costa Rica: Characteristics of Male and Female Cohorts Born Before 1956 (Persons Aged 45 or More Years in 2000), by Year, 1973, 1984, 1990, 1995, and 2000.

Cohort characteristics	Males				Females			
	Census			Household Survey	Census			Household Survey
	1973	1984	2000	2000	1973	1984	2000	2000
Percentage of...								
Non-insured								
1926-1935	59.5	26.4	8.1	6.8	59.0	20.7	6.5	4.3
1936-1945	51.2	27.5	17.7	16.3	52.3	22.8	9.0	7.8
1946-1955	60.1	27.8	22.3	22.6	62.1	22.5	13.1	13.6
Direct insured *								
1906-1935	39.8	41.1		54.3	9.2	13.9		28.9
1936-1945	48.6	51.5		45.4	17.3	21.5		25.0
1946-1955	38.6	55.5		47.3	16.9	24.6		25.6
Insured family member								
1906-1935	0.7	5.4	7.7	8.0	0.7	49.7	34.7	37.3
1936-1945	0.1	1.4	5.3	7.4	0.1	48.2	45.6	49.2
1946-1955	1.3	1.4	2.3	2.7	1.3	46.9	45.6	45.7
Pensioned on Public Account								
1906-1935				5.0				5.4
1936-1945				4.5				6.7
1946-1955				3.8				7.2
Pensioned under RNC								
1906-1935				16.2				20.7
1936-1945				3.2				6.7
1946-1955				0.9				1.4

Source: Prepared by author based on the 1973, 1984, and 2000, and the *Encuesta de Hogares* 2000

Note: *   In the 2000 Census, it is difficult to place the "direct insured", in the *Encuesta de Hogares* the proportion was estimated suming the those insured by salary or wages and those under the Non-Contributory Regime (RNC) for Disability, Old Age, and Death (IVM).

Table 5. Costa Rica: Percentages of Persons by Categories of Insured Condition, by Gender and Level of Education, 1973-2000.

| Categories of condition of insurance	Total		Males		Females	
	Primary incomplete or less	Primary complete or more	Primary incomplete or less	Primary complete or more	Primary incomplete or less	Primary complete or more
Percentage of ...						
Non-insured						
1973	61.4	56.8	62.3	56.6	60.6	57.0
1984	25.8	18.5	29.2	20.5	22.6	16.4
Census 2000	7.5	6.9	8.6	7.2	6.6	6.6
EH 2000	5.8	5.6	7.9	6.3	3.8	5.0
RNC						
EH 2000	24.6	5.9	21.6	4.7	27.4	6.9
On Public Account						
Census 2000	25.4	7.6	23.1	6.7	27.5	8.5
EH 2000	6.8	2.2	6.3	1.9	7.1	2.4

Source: Prepared by author based on the 1973, 1984, and 2000 Censuses, and the *Encuesta de Hogares* 2000

Table 6..   Costa Rica: Proportion of Persons Born Between 1906 and 1935 Who were not Insured in 1973, 1984, and 2000, and Proportion with Pension under Non-Contributory Regime (RNC), by Region and Gender

Region	% Non-insured Census			% RNC HH Survey
	1973	1984	2000	2000
Total				
Central Region	51.1	21.9	6.6	13.2
Chorotega	77.5	27.7	9.5	37.3
Central Pacific	67.2	23.3	7.0	25.4
Brunca	92.8	25.1	6.8	34.9
Huetar Atlántica	57.1	25.6	10.0	19.7
Huetar Norte	76.9	37.4	11.0	26.0
Males				
Central Region	50.7	24.4	6.9	10.0
Chorotega	77.2	30.9	11.1	34.4
Central Pacific	66.9	26.0	8.2	19.0
Brunca	92.4	28.0	8.2	34.3
Huetar Atlántica	54.7	28.4	11.5	17.6
Huetar Norte	76.8	40.6	12.7	25.3
Females				
Central Region	51.4	19.7	6.3	15.6
Chorotega	77.7	20.5	7.7	40.3
Central Pacific	67.7	20.3	5.8	32.3
Brunca	93.4	21.3	5.2	35.7
Huetar Atlántica	60.4	21.9	8.2	22.6
Huetar Norte	77.0	33.4	9.0	26.8

Source: Prepared by author based on the 1973, 1984, and 2000, and the *Encuesta de Hogares* 2000

Figura 8. Costa Rica: Proportion of Persons Aged 65 or More Years Living in Poor Households, by Region, Educational Level, and Right to the Non-Contributory Regime, 2000 (95% Confidence Intervals)
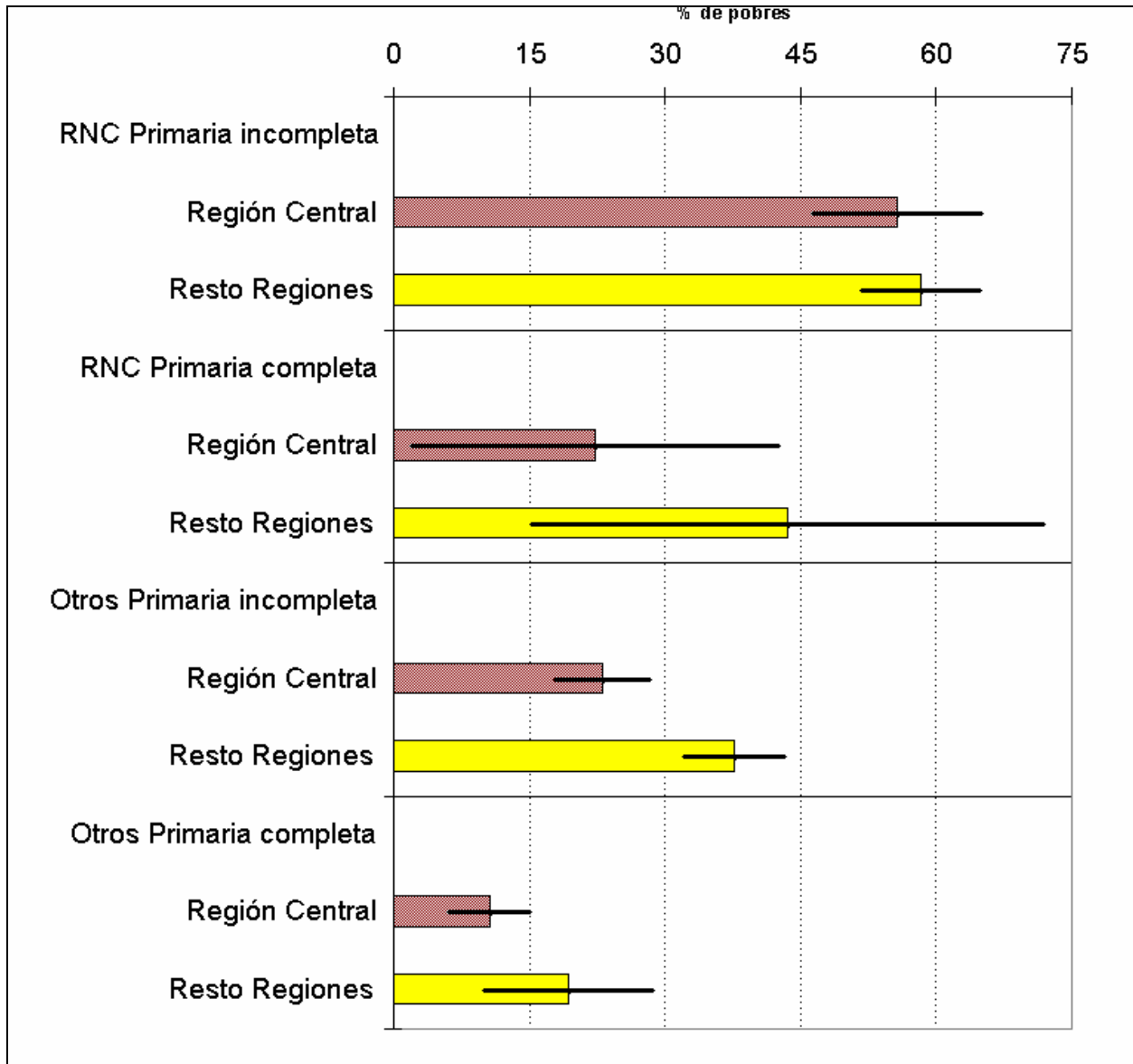
————	*95% Confidence Interval*
Source:	Prepared by author based on the *Encuesta de Hogares* 2000

APPENDICES.

Table A1. Latin America: Percent Poor by Country, According to Zone of Residence and Large Age Groups (Around 2000)

Country	Urban			Rural	
	10-59	60 or more		10-59	60 or more
Bolivia	49.7	39.4		77.7	74.4
El Salvador	41.4	41.9		66.4	59.8
Honduras	69.8	69.9		82.7	76.9
Paraguay	42.5	38.7			
Brazil	28.8	13.7		54.8	17.4
Colombia	42.4	36.9		57.1	52.6
Costa Rica	17.2	18.2		21.9	32.1
Ecuador	53.9	47.1			
México	43.7	36.4		60.4	51.2
Panama	21	14.9		45.5	38
Dominican Rep.	32.1	36.9		36.4	35
Venezuela [a]	44.7	39.5			
Argentina [b]	15.9	11.7			
Chile	19.9	9.8		26.7	16.6
Uruguay	9.3	2.4			

Source: Del Pópolo (2001)
Note: [a] National Total.   [b] Corresponds to Greater Buenos Aires

Table A2. Diagnosis of Logistic Regressions to Estimate Cohort Effects, by Model

Diagnostic measures	Base model	Model with education and interaction	Model with all the variables
Males			
Log of Likelihood	-37,882.9	-37,873.4	-37,872.8
Wald test (Chi^2)			
Age effect	315.75 *	240.67 *	143.87 *
Cohort effect	91.18 *	57.50 *	57.10 *
Period effect	270.12 *	166.03 *	164.91 *
Education		15.70 *	15.25 *
Interaction with 1984 and +		3.40	2.80
% labor force participation			0.01
% heads of household			1.23
% widowhood			0.02
Females			
Log of Likelihood	-41,102.4	-41,097.1	-41,088.5
Wald test (Chi^2)			
Age effect	297.28 *	278.60 *	241.78 *
Cohort effect	90.83 *	78.44 *	70.41 *
Period effect	298.46 *	210.75 *	150.84 *
Education		10.71 *	10.69 *
Interaction with 1984 and +		0.01	0.04
% labor force participation			0.10
% heads of household			16.13 *
% widowhood			2.97

Note: * p<0,01