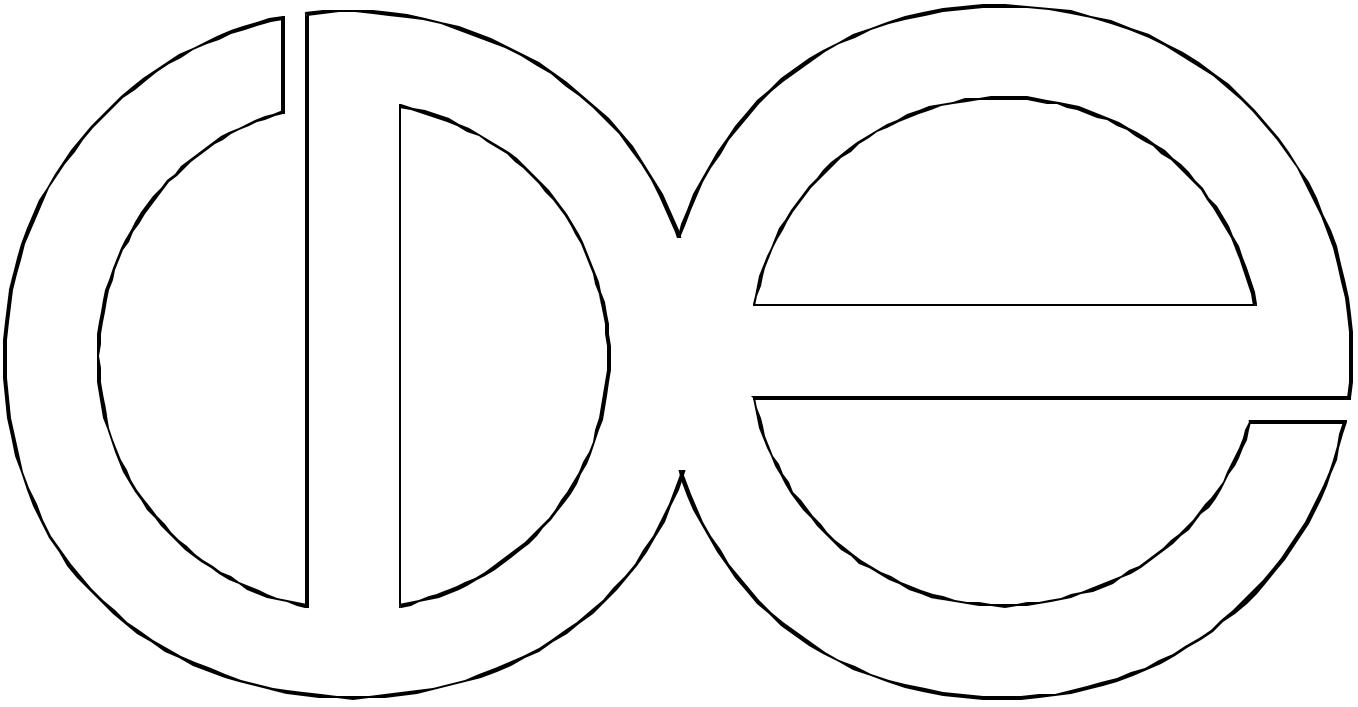
Center for Demography and Ecology

University of Wisconsin-Madison

Aging in Latin America and the Caribbean

Alberto Palloni
Susan DeVos
Martha Pelaez

CDE Working Paper No. 99-02



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Alberto Palloni [^]
Susan DeVos [^]

and

Martha Pelaez [\]

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^ Center for Demography and Ecology, University of Wisconsin
\ Pan American Health Organization

Abstract

This document evaluates the nature of aging in Latin America and the Caribbean, and reviews available evidence regarding the demographic profile of the elderly, their health and disability status, the composition of their human capital, labor force participation and retirement behavior, residential arrangements, and intergenerational transfer systems. The review identifies problematic areas to take account in the design and implementation of public policies. Among them we include the following: an accelerated pace of demographic aging, large expected differentials in the process of aging (by rural-urban residence and by socioeconomic groups), sharp gender inequalities, unfavorable composition by health and disability status, dissolution of traditional family-based support systems, and insufficient development of institutional transfers mechanisms.

I. Introduction

Our objective is to review key features of the aging process in countries of Latin American and the Caribbean. Section II clarifies concepts and identifies the most important dimensions of the aging process. In section III we discuss these dimensions and, to the extent allowed to us by data available, we empirically evaluate each of them for countries in the region. The final section of the paper summarizes the most urgent public policy roadblocks.

II. Aging as an outcome of different dimensions

When we speak of 'aging societies,' the imageries conjured differ sharply. In some cases they revolve around nearly bankrupt pension or social security systems, or about families physically and economically overburdened with responsibilities of simultaneously caring for very young children and the very old. In others, we point to societies overloaded with unsatisfied health care demands of the chronically ill, functionally disabled, and the mentally and physically impaired. In yet others, references to aging evoke rumblings about stagnant economies, snail-paced increases in productivity, heavy taxation burdens, conservative ideologies, and dismal mobility prospects for younger generations. As we indicate below, and as is plain from reviews of the process in general (United Nations, 1994; Kinsella, 1988; Martin and Kinsella, 1994, Kinsella, 1994; Kinsella, 1991, Kalache and Coombes, 1995) or in particular countries (Soldo and Agree, 1988; Taeuber, 1992; Soldo, 1980; Treas, 1995; Ham-Chande, 1995; Arriaga and Damonte, 1990; Hernandez Castellon, 1994; Brenes et al., 1990), each and every one of these issues corresponds to a dimension of the aging process. What societies choose to emphasize, what researchers identify as salient or interesting, and what policy makers conceive as strategic, will vary across countries and time periods. This will inevitably lead to heterogeneous evaluations about what the nature of aging is, and to a sense of ambiguity and uncertainty about the need, formulation, and implementation of public policy.

Without losing generality one may pose that the process of aging depends on k dimensions contained in a set {X} of variables, X1, X2, X3,…,X_k. For simplicity, assume that each variable is discrete with, say, three possible values, high, intermediate and low. The value observed for each variable in a society at a point in time will depend on some or all of the following factors: demographic conditions, including the long term dynamics of fertility, nuptiality, and mortality; the history of morbidity for cohorts who belong to the elderly population; prevailing policies and political institutions; social and economic settings; levels of

technology; and cultural traditions. Variability in these conditions will lead to variance in the values attained by the X's, and this alone can account for inter-country variance in the aging phenomena. In addition, however, it is possible that the variables are themselves dependent on each other so that the overall configuration of the set {X} will differ if the nature of relations between the X's changes. At any point in time, the aging process in a society will be a function of the particular combination of values and relations associated with the X's, and its trajectory over time will reflect the process of change in values and relations between X's.

Nothing in this characterization implies that all societies will follow the same stages in the aging process or that, if they do, they will experience them in the same order. Different descriptions of the nature of aging may simply reflect empirical conditions rather than being the result of distorted perceptions. Thus, the variability in imageries alluded to before is consistent with the variability of historical forms of the phenomenon. By the same token, however, it follows that what are fitting policy solutions in a society at a given point in time may be inadequate or totally misguided at other points in time or in other societies.

III. Dimensions of the aging process

The most important dimensions of aging we consider in this paper are the following: demographic, health, labor force, residential arrangements, and intergenerational transfers. The **demographic** dimension consists of conditions related to the relative size or stock, rate of growth, and composition of the elderly population. The **health** dimension is a function of conditions that determine the current and prospective health status of the elderly population and their demand for and rate of use of health care. The **labor force** dimension refers to the dynamic of labor force participation among the elderly, its age and sex profile, as well as its distribution by economic sector. **Residential arrangements** refer to characteristics of households where the elderly reside. In many countries of the Latin American/Caribbean region, support of the elderly is manifested in co-residence, an arrangement that forms part of broader exchanges between children and grandchildren, and their parents and grandparents. The **intergenerational transfers** dimension refers to institutionalized transfers such as pension systems as well as to informal and formal exchanges between kin, and family members.

It may be possible to weigh these dimensions to produce an overall indicator of elderly well-being. Such an index could lead to a formal appraisal of quality of life of the elderly, encompassing a number of conditions including fairly objective ones such as health status,

morbidity and functional disability, and more subjective ones such as perceived life satisfaction. In what follows we discuss the nature of each dimension and, to the extent made possible by available information, we assess them empirically in selected countries of the region.

A. Demographic dimension

A.1. Stock indicators

Aging of a society is first of all a demographic phenomenon. Unlike individuals who can only age as time passes, societies can age and become younger. A 'youthful' society is one with a young age distribution, that is, an age distribution with a high proportion of individuals below age 15 or 10. By contrast, an 'aged' society is one whose population has an old age distribution, or one with low proportions below age 15 or 10. More generally, the term 'elderly population' makes reference to the proportion of a population older than T, where T is an arbitrary age taken to be a boundary between old and young. Because of its association with labor force participation and retirement in developed economies, T is normally defined to be 65, although in many cases demographers and policy makers alike prefer to work with a boundary age within the range 50-60 instead. By the more traditional definition, an 'aged society' is one where the proportion of the population aged 65+ at time t is relatively high. The less traditional definition, and the one we will use throughout this paper, refers to the fraction of the population above age 60 at time t, C(t). Although what is 'high' or 'low' is not unambiguous, there is some fairly general agreement that a society is relatively old when the fraction of the population aged 65 + exceeds 8-10 percent or, alternatively, when the population aged 60+ exceeds 10-12 percent. Other measures of aging are equally useful though not necessarily more frequently used. The median and mean age of the population at time t, M(t) and A(t) respectively, are obvious choices even though A(t) is frequently ignored in the literature. As we will see below, A(t) turns out to be of great utility to understand the underlying demographic dynamics of aging (Preston and Lahiri, 1991; Grushka and Preston, 1995; Himes et al., 1994). Finally, the ratio of the elderly population to the potentially active population, or $R(t)=C(t)/H(t)$, where C(t) is the (unweighted) fraction above age 60 and H(t) is the (unweighted) fraction between 20 and 60, is also a useful indicator of aging. To the extent that the population included in the numerator of R(t) is in a net consumption phase of their life cycle whereas the one included in the denominator is in a net production phase, R(t) is crucial for an understanding of intergenerational transfers, taxation policies, and saving behavior (Lee, 1994; Lee and Tuljapurkar, 1997). As we show later, these

indicators are closely interrelated, but the relation is weaker in populations, such as those in the Latin American/Caribbean region, that depart from a neat stable equilibrium.

A.2. Comparative statics: demographic determinants

In this section we examine the observed and projected values of C(t), M(t), A(t) and R(t), identify determinants of A(t) and C(t), and use comparative static to illustrate the relations involved via model stable populations. Throughout, we discuss the role of fertility and mortality and ignore the role of migration.

A.2.1. Observed and projected values

Populations with sustained high levels of fertility will have lower values in all three indicators than populations with lower fertility levels. This is because in high fertility populations more recent cohorts are larger than the preceding ones, thus tilting the age distribution toward younger ages. The higher fertility levels are, the larger the disparities in the size of successive cohorts, and the more powerful is the bias of the age distribution toward younger ages.

Mortality has an ambiguous effect on the indicators. In societies with high mortality levels, an improvement in survival conditions leads to lower values of C(t), M(t), A(t) and R(t) because those who benefit most from the improvements tend to be infants and young children, not adults. Like the effect of higher fertility, a lowering of mortality levels increases the relative size of the cohorts who are younger than 5 years. However, in societies with lower levels of mortality, improvements in survival tend to benefit more adults and elderly people, thus tilting the age distribution in the other direction. As a result, if we compare two societies with similar levels of fertility but different levels of mortality, the one with a lower level of mortality will have higher values of M(t), A(t), C(t) and R(t) than the one with higher mortality if and when mortality levels are relatively high. At lower levels of mortality the contrast between one and the other society will be reversed, so that the one with lower mortality will experience higher values in all four indicators (Coale, 1972).

As a consequence of these relations, the association between these three indicators among populations that experience the same regimes of mortality and fertility for a long time, is very tight. Indeed, in this comparative static framework, joint knowledge of more than one indicator provides redundant information. However, outside the boundaries of a comparative static framework, in societies that experience de-stabilized demographic regimes where fertility or

mortality or both have been changing, the relation between the indicators will not always be as close, and examination of each indicator may merit separate attention.

No country in the region belongs to a stabilized population form. In one way or another, all of them represent cases of de-stabilized populations. The actual regimes of de-stabilization are quite heterogeneous but admit a rather simple, though coarse, characterization (Palloni, 1990; Merrick, 1991). With a few exceptions (Argentina, Cuba, Puerto Rico, and Uruguay), countries in Latin America and the Caribbean experienced high levels of fertility until about 1965-1970, when a precipitous decline began to spread in all but a handful of nations (mostly in Central American, Bolivia, Peru and Ecuador). Unlike fertility, mortality levels in a number of countries began to decline prior to 1950 although the bulk of gains in survival took place during the Post-World War II era. In Argentina, Cuba, Puerto Rico and Uruguay, pre-transitional fertility levels were lower than in the rest of the region, and began to decline before 1945. As of 1990 the age structure of all countries in the region reflect de-stabilized demographic regimes, mostly a combination of recent sharp fertility reductions and of less recent but equally sharp reductions in mortality. From this stylized representation one could expect that all four indicators of aging have low values around 1950 and begin a steep ascent thereafter. This is shown in Table1, which displays values of C(t), R(t), M(t), and A(t) for 1950 and 1990, and projected values for 2025 for a number of countries in Latin America and the Caribbean. For comparative purposes we also display the value of the indicators for US and Japan. Maps 1 and 2 illustrate graphically the geographic contours of one of the indicators, C(t). Although the progression over time of the indicators is as expected, their association is not as close as it would be among stabilized populations.[1]

[Table 1 about here]

With the exception of Uruguay, the value of C was below 10-12 percent everywhere in 1950. According to the latest observed statistics for 1990, Argentina, Cuba, Barbados and Puerto Rico join ranks with Uruguay. Projections for 2025 suggest that only four countries will have age structures with C(t) below 10-12 percent. It should be pointed out that the projected values for

[1] Estimated linear (and non-linear) relations between pairs of indicators in observed populations yield values of R^2 below .70 whereas among stable populations, that is, those from a comparative static framework, the R^2 exceeds .90.

2025 depend on reasonable assumptions about fertility decline and, above all, on forces that, as we show below, were set in motion well before 1990. Alternative assumptions about fertility decline after 1995 will not change much the values of the indicators of aging for 2025 since the tug of the demographic past is fairly powerful everywhere. Note that C(t) increases sharply and approaches values similar to those reached by the US and Japan (about .20) in a number of countries.

R(t) can be thought of as the number of elderly dependents per person in the labor force. Its values change from a level around .10 (1 elderly per 10 workers) to close to .20-.30 (1 elderly per 3 or 5 workers). This is a sharp increase that, in theory at least, will translate into potent pressures on systems of intergenerational wealth transfers, and on the size of demand for health care.

M(t), the median age of the population, increases steadily from levels around 20 to values exceeding 30. By 2025 we expect that only five countries in the region will have M(t) below 30, whereas Barbados and Cuba will have M(t) above 40 years, a value surpassed only in Japan.

As is well-known the mean age of the population, A(t), is very sensitive to the trajectory toward older age distributions. Whereas in 1950 most countries of the region had values below 25 years, by 2025 we expect all of them to have values of A(t) exceeding 25 years, and most of them will attain values surpassing 30 years. During the period 1990-2025 A(t) will increase, on average, from 27.2 years to 33.3 years, a proportionate increase of about 20 percent. These are larger rates of increase than those prevailing during the period 1950-1990 in the US and Japan, and larger than those expected to prevail in the US from 1990 until 2025. Figure 1 shows the trajectory of A(t) for selected countries in the region and for the US. This figure suggests that countries in the region are experiencing large changes in A(t) that, relative to the US, occur at relatively lower levels of A(t). This means that the aging process is proceeding more rapidly, with changes packed in a compressed period of time.

[Figure 1 about here]

A.2.2. Demographic determinants

Changes in A(t) are revealing of forces responsible for the progression of the aging process. What are these forces? Why are they leading to apparently accelerated changes? To

what extent are they part of an unstoppable momentum toward older populations, and to what extent are they still malleable and responsive to policies? As we did before, we will first address the issue in a comparative static framework.

Suppose we observe two populations that experienced constant mortality and fertility regimes. Assume further that while mortality is identical in both societies, one of them has higher fertility levels. The difference between mean ages will be a function of the difference in the rates of natural increase, r, induced by a higher level of fertility. In particular, if the ratio of sizes of two cohorts born in two successive years is exp(r) in the population with lower fertility (population 1), and exp(r+) r) in the population with higher fertility (population 2), the difference in the mean age between the latter and the former,) $A=A_2-A_1$, will be given by:

$$\Delta A = -\Delta r \int_o^w a^2 c(a) da$$

where c(a)da is the fraction of the population aged a in the first population. This relation can be approximated numerically, and suggests that, on average, A(t) changes by about 4.2 years per every .01 change in r. When both populations experience the same level of fertility but population 1 experiences a higher mortality regime, the difference in the mean age can be expressed as:

$$\Delta A = \int_o^w ac(a)(\exp(-j(a)) - 1) da$$

where n(a) is the sum of the differences in age-specific mortality rates from birth to age a between the two populations. The quantity n(a) will always be negative since mortality rates in the second population are lower throughout the life span. This expression can also be approximated numerically indicating that an increase in life expectancy of about one year yields a change in the mean age of the population of about .19 years when the lowest of the two life expectancies is initially above 45 or 50.

Finally, if two populations differ simultaneously in their fertility and mortality regimes, the difference in mean ages will be, to a close approximation, equal to the sum of differences associated with changes in fertility and mortality. In particular, when levels of mortality are

similar to those experienced by countries in Latin America around 1990, with life expectancies above 55 or 60, survival improvements and fertility reductions will, in most cases, reinforce each other to produce increases in the mean age of the population.

Although the comparative static framework is suggestive and helpful for interpreting the trajectory towards older populations in the region, it is insufficient to understand some of its details, particularly the compressed schedule of aging in the region, and especially the forthcoming changes between 1990 and 2025. To understand the nature of the differences in A(t) and C(t) in countries of the region after 1990 we need a dynamic framework, one that accounts for the demographic transitions that virtually all countries experienced before, during and after the 1990's.

A.3. Comparative dynamics

We begin by introducing the notion of age-specific rates of increase and then provide an interpretation of changes in C(t) and in A(t) in populations with de-stabilized population regimes.

A.3.1. Age-specific rates of increase: how do populations inherit the past?

Just as the natural rate of increase expresses the proportionate change in the size of a population between two points in time, so age-specific rates of increase express the proportionate change of the size of the population in an age group between two points in time, t and t+dt. A number of inferences can be derived from this elementary fact (Preston and Coale, 1982; Horiuchi and Preston, 1988; Preston et al., 1989). In particular, the rate of increase at time t in the population aged x is given by:

$$r(x, t)=\ln (N(x, t+dt)/N(x, t))$$

The size of the population aged x at time t is simply the births that took place t-x years ago times the probability of surviving x years,

$$N(x, t)=B(t-x)*S(t-x, x)$$

where B(t-x) is the number of births (t-x) years ago, and S(t-x, x) is the probability of surviving to age x for those born t-x years ago. Similarly, the population aged x at time t+dt is

$$N(x, t+dt)=B(t+dt-x)*S(t+dt-x, x)$$

When mortality is not changing, the survival probabilities are identical, and the rate of increase in the age group x is simply

$$r(x, t)=\ln (B(t+dt-x)/B(t-x))=r_B(t-x)$$

the rate of growth of births between years (t-x) and (t+dt-x). When mortality, but not fertility, is changing, the sizes of the birth cohorts are identical and the rate of increase is given by:

$$r(x, t)=\ln (S(t+dt-x, x)/S(t, x))=-I(x)$$

where I(x) is the sum of differences of the age specific mortality rates from age 0 to age x experienced by the two cohorts. Thus, upward pressure on the size of the population aged 60 in the interval t and t+dt will occur for one or two reasons: either mortality before age 60 improves before t+dt, or the size at birth of the cohort who reached its 60th birthday between t and t+dt is larger than the preceding one. Figure 2 displays the value of r(x,t) for ages above 60 in 1990 for selected countries in the region.

[Figure 2 about here]

These considerations also apply to the case of the population **60 and above**, with one qualification: the rate of increase of the population 60+ will depend not only on changes in the probability of surviving up to age 60 (reflecting cumulative changes in mortality before age 60), but **also** on mortality changes above age 60. In particular, the rate of increase of the population 60+ is given by:

$$r(60+, t)=r(60, t)-J(60)$$

where J(60) is the sum of the differences in mortality rates above age 60 between the cohorts aged 60+ at time t and the cohorts aged 60+ at time t+dt. The component J(60) is entirely due to

changes in mortality conditions at older ages whereas I(60) is largely determined by improvements in mortality in early childhood and, to a lesser extent, by improvements in adult ages.

Figure 3 displays the values of r(60+, t) for selected countries in the region. To have a sense of magnitude it is important to remember that with constant rates of natural increase around .020, the doubling time of a population is of the order of 35 years whereas a rate of increase of about .040 leads to a doubling time about half as long. According to the estimates in Figure 3, the population aged 60+ during the period 1980-2025 in the region will experience at least one doubling, and in most cases it will quadruple before the year 2025. Note also that the rates of increases observed and expected in the region are well above the levels observed and expected in the US.

[Figure 3 about here]

Table 2 displays the values of r(60+, t) side by side with the rates of population growth, r(t), for three periods of time. Table 8 displays the values of the probability of surviving up to age 60, (S(60)), and the life expectancy at age 60, E(60), for approximately the same periods of time. While Table 2 represents the actual growth of the elderly population, Table 8 displays two of the three forces behind that growth, namely, mortality changes before age 60 (reflected in changes in S(60)), and mortality changes after age 60 (reflected in changes in E(60)).

[Table 2 about here]

The figures in Table 2 highlight two features that are not well known. First, with a few exceptions, the rates of increase for the population 60+ during the more recent period (after 1990) are much higher than the rate of increase for the total population. Second, the rates of increase for the population above age 60 exceed the rates of increase for the total population for a long period of time, and the difference has increased over time. This simply reflects the fact that the seeds of rapid aging in the region have been present though unnoticed for quite a long time. Aging of the population is not something that occurs overnight even though it may appear to be so.

We have now in place sufficient elements to understand the demographic forces responsible for the growth of the elderly population in Latin America and the Caribbean. If we wish to understand the trajectory of the population aged 60+ during the period 1990-2025 we need to focus on three components:

a. changes in fertility during 1930-1965;
b. changes in mortality before age 60 during 1930-1965;
c. changes in mortality after age 60 during 1990 - 2025;

As we mentioned before, although the demographic trajectory in the region is quite heterogeneous, it admits a simple characterization that is useful to infer the forces affecting aging. Most countries in the region experienced high fertility levels (TFR above 5.0) before 1950 and large mortality declines starting in 1930-1940, but particularly after 1950. Between 1950 and 1965-1970, and for reasons that are yet not altogether clear, the majority of these countries experienced increases in fertility, with their TFR increasing to levels around 6. The onset of sharp fertility declines occured around 1970, and initiated a trend expected to continue well into the 21st century.

Two consequences of these trends for aging are worth noting. First, individuals who attain their 60th birthday between 2000 and 2025 belong to birth cohorts inflated by the surge of fertility of the years 1950-1965. Thus the rate of increase of the age group 60+ will increase in part because of past though transient higher fertility levels. Second, and most important, the cohorts that attain the 60th birthday between 2000 and 2025 are the beneficiaries of unusually large improvements in survival, particularly during early childhood. Thus, individuals born, say, in 1960 experienced much lower levels of early child mortality than those born in 1955. This will increase the relative size of the cohort attaining age 60 in 2025 relative to cohorts that reach age 60 in the year 2020. Since these changes already occurred, there is nothing we can do to modify their effects on the size of the elderly population.

Table 8 provides information about the relative contribution of two of the three factors responsible for the growth of the population 60+. Although the third factor--rates of increase in the size of birth cohorts--is not documented in the table, we believe this to have played only a minor role, at least when compared with the other two factors. The figures in Table 8 suggest a

rather straightforward story, namely, that the largest component in the growth of the population 60+ is due to mortality changes below age 60.[2]

A.3.2. Long-term effects on C(t) and A(t)

i. Changes in C(t)

Age-specific rates of increase provide another instrument to characterize aging, and could be used in isolation from other indicators. As noted before, with sustained rates of increase of the population 60+ of the order of magnitude expected in the region during the period 1990-2025, the population 60+ will double approximately every 15 to 20 years, a somewhat grim prospect. But the matter of aging, at least as reflected on C(t), also depends on the dynamics of the population younger than 60: if this population grows as fast or faster than the population at older ages then some key issues, such as support of the elderly, are less pressing even though the absolute growth of the elderly population may have problematic consequences of its own. In this view what matters for the aging process is the **relative growth** of the two segments of the population: to the extent that and for as long as the population aged 60 and above grows faster than the population below age 60, there will be aging. Upward pressure on the **fraction** of the population aged 60+ will depend on r(60+, t) but must also reflect what occurs to the population in the younger age groups. Indeed, one can show that the rate of increase in the **fraction** aged 60+ in year t, s(60+, t), is given by

$$s(60+, t)=r(60+, t)-r(t)$$

where r(t) is the total rate of growth of the population. Aging of the population or rapid increases in the fraction of the population aged 60+ will proceed at a faster pace the larger the differences between the rates of increase are, and the longer the regime is maintained. Since expectations are that fertility will continue to fall toward very low values, r(t) will decrease steadily whereas, due to factors examined before, the values of r(60+, t) will continue to increase. The consequence of these two reinforcing trends will be large increases in the rates of increase of the population older than 60.

[2] A more thorough demonstration of this statement requires extensive calculations which are not shown here. These calculations involve estimating the time trend of the number of births from around 1880 until 1990. They indicate that, on average, the increase in the size of birth cohorts from 1880 does not contribute more than 30 percent of the total growth of the population aged 60+ from 1990 onward.

ii. Changes in A(t)

Examination of all the components of change of A(t) is computing intensive and demanding. To provide a sense for the nature of those changes, we calculate 'average' profiles of mortality decline over a long period of time for several countries in the region. We then estimate the (absolute) magnitude of the contribution of mortality change to the rate of increase of the population in several age groups that are part of the elderly population. As a contrast we also plot the absolute contribution of mortality change to the growth of the same age groups estimated for the US in 1980-1990. The results are displayed in Figures 4a and 4b. The vertical axis in each figure represents the total change of cumulated mortality rates experienced by cohorts reaching ages noted in the horizontal axis during the year 1995 or 2020. Thus, when compared to those aged 55-59, Chileans aged 50 to 55 in 1995 experienced reductions in mortality rates after birth of the order of .022. For Mexicans aged 85+ in 1995 the figure is about .042. As expected, the absolute cumulated changes in mortality are larger for all relevant cohorts circa 1995 than for the year 2020. Similarly, countries that experience more recent mortality declines tend to have larger absolute levels than countries where mortality began to decline early in the century.

[Figures 4a and 4b about here]

We estimate that, on average, about 75 percent of the very large increases in the mean age of the population between 1990 and 2025 for countries in the region are attributable to mortality changes experienced during the period 1930-1990. About 70 percent of this change is due to changes in mortality associated with infectious diseases in the first five years of life. This is an impressive statistic: **it suggests that the relatively compressed schedule of aging in the region can be traced back to the medical and public health revolution that triggered the mortality decline nearly half a century ago**. As we discuss below, this legacy of the past has important implications for the health status and disability of the elderly population after the year 2000.

A.4. Composition of the elderly population

Stocks and flows defining the demographic profile of an elderly population are not sufficient to fully characterize the potential social and economic consequences of aging. A key

dimension is the composition of the elderly according to age, gender, marital status, social class and rural-urban residence.

A.4.1. Age composition

While the characterization 'elderly population' to describe those who are older than 60 is convenient and expeditious, it is also misleading. This is because individuals aged 60 and above are an extraordinarily heterogeneous population in terms of their health and disability status, demand for health and care services, and social, economic and emotional needs. Although prevalence of chronic illnesses and functional disability rises steadily after age 60, it accelerates rapidly after age 80 (Manton, Corder and Stallard, 1993; Crimmins et al., 1994, Crimmins et al., 1997; Singer and Manton, 1994; Fries, 1980; Suzman, Willis and Manton, 1992) so that even though there are no discrete jumps in prevalence measures, the composition of the elderly population by health status changes sharply. Similarly, while many among those aged 60-69 are at least partially active in the labor force, participation rates decrease markedly thereafter, with the consequent increase in economic dependence that follows from complete withdrawal from labor force markets. Finally, the oldest among the old are more likely to have lost a spouse, less likely to exert control over kin networks, and more likely to depend on younger members of their closest family. These are important reasons to examine in more detail the age distribution of the population aged 60+. In particular, we establish age 80 as a cutting point and focus on the proportion of the population 60 and above which is older than 80. Table 3 displays figures for selected countries in the region for 1995 and 2025. It should be noted that values after 2025 will be much higher since they will mirror at ages above 80 the large increases in the population aged between 60 and 80 which will take place between 2000 and 2025. By 2025 the fraction aged 80 among those aged 60+ will exceed 10 percent in all countries, and in some of them the increase will be more substantial. Cuba will continue to show the highest level (about 18 percent), despite a mild decline relative to 1995. Uruguay, Chile and Peru will display the highest relative increases (about 30 percent) between the two dates.

[Table 3 about here]

A.4.2. Gender composition

Aging in countries of the region is above all a gender problem. This is because the population aged 60 and above and 80 and above is disproportionately composed of females. Rather than showing the male-to-female ratios above 60, Table 4 displays male-to-female ratios at 75 and above, which reflect better the sharp differentials that occur at very old ages relative to more muted differentials in the open age group 60+. Estimates for 1995 and projected values for 2025 indicate than fully **two-thirds** of the population older than 75 will be composed of females. This is an extraordinarily large gender imbalance, especially in contrast to the more benign ones at younger adult ages where the female population rarely exceeds the male population by more than a few percentage points. The main factor explaining the low male-to-female ratios at older ages is the gender gap in mortality, which favors females by a significant margin. There are two contributors to this gap: the probability of surviving to age 60, and the mortality experience above age 60. The importance of the first factor can be gauged from estimated values for the probability of surviving up to age 60 prevailing before the period when the corresponding cohorts attain ages 60+ in 1995 and in 2025. For those attaining 60 and above during 1995 the life tables of interest are those applicable to the period 1895-1935. For those attaining age 60 and above in 2025 the period of interest is (approximately) 1925-1965. In order to simplify presentation, Table 4 displays the ratios of the probabilities of surviving up to 60 in the life tables applicable to 1990-95 which must contain higher sex differentials in mortality than those that prevailed at lower levels of life expectancy. The corresponding values for the life tables applicable for 2025 will account for future sex imbalances but not for those we observe in 2025 or before.

Note that in all countries in the table males stand a chance of surviving to age 60 that is fully 10 to 15 percent lower than among females. These differentials are a powerful contributor to the gender gap in the population aged 75 and above, but they are by no means the full story. Indeed, the other component, the gender gap in mortality at older ages, is of equal or more relevance. Differentials in life expectancy at age 60 neatly summarize the mortality experience at older ages, and we should focus on those that prevail close to the period when we examine the gender gap. Columns 3 and 6 of the table show the ratios of male to female life expectancy. In 1995 females are expected to live fully three to four years longer than males after reaching age

60 (about 20 percent longer), but the gaps may grow by the year 2025 as they do, for example, in the cases of Brazil, Costa Rica, Cuba, and Peru.

The full significance of these disparities will be discussed later. However, the main point can be made briefly: the most vulnerable among the elderly population in the region are women, particularly widowed women. Their vulnerability is first and above all a result of their lesser power to secure adequate economic resources. It should be remembered that until recently females remained outside the boundaries of formal labor markets, and enjoyed few of the privileges associated with it during and after active labor force participation. Secondly, women's health status appears to be much worse than among males at comparable ages. This suggests the existence of a larger potential demand for formal and informal sources of care. Thus, to the extent that future survival gains continue to increase gender disparities in mortality, aging in the region will be associated with a larger demand for services for elderly women.

[Table 4 about here]

A.4.3. Marital status composition

A corollary of the gender gap in the stock of elderly populations in the region is that a high fraction of those who reach older ages will be widows, with the associated consequences in terms of economic vulnerability, social isolation and emotional distress. Although the relative magnitude of the population of widows and widowers among the elderly is a function of gender differentials in mortality, the pattern of age difference between spouses, and gender differentials in remarriage patterns, it is the gender gap in mortality that explains most of the differences. Table 5 displays the fraction of women in various age groups who are not in a union or partnership. They include not just widows but also those who are separated from their spouse, divorced and single. In countries with high levels of consensual unions (Jamaica, Trinidad and Tobago and countries of the Northern fringe of South America, such as Colombia and Venezuela), the fraction self-reporting as never married (single) may be somewhat exaggerated. In these cases the figures in Table 5 may overestimate somewhat the proportion that does not live in a union or partnership. Despite this, most elderly women classified as not living with a partner are widows, the most immediate consequence of the gender gap in mortality.

Although the figures in Table 5 are from disparate sources, they conform to expected patterns. First, note that in all cases except in Cuba more than half the women older than 60 do not live in a union or partnership. This does not mean that they live alone or that they do not receive kin support. The figures only reflect the absence of a partner and are thus a crude indicator of a risk factor for lack of support. Second, the proportion of women living alone declines over time, reflecting the decreased incidence of widowhood that results from adult mortality declines. Another factor contributing to the decline of women out of partnership is the reduction in the fraction of single women. particularly in countries with high prevalence of consensual unions. This is likely to reflect a tendency toward easier recognition of consensual unions and a decreased drive to conceal these unions under the mantle of singlehood.

[Table 5 about here]

To the extent that labor force participation in Latin America and the Caribbean has been historically dominated by males, most women receive economic support that is entirely dependent on their partner's ability to secure claims over assets, public assistance and welfare, and pension funds. If this is so, widowing may be the starting point of a spiral leading straight into poverty, much as it occurs elsewhere in the developed world (United Nations, 1991). As we show below, this is complicated by the fact that elderly women's health status appears to be worse than among males of comparable ages. The only forces that can offset a trend toward higher prevalence of poverty among elderly women are family arrangements, and the social and economic support network of children and grandchildren. However, although children's support for elderly parents is still quite widespread in Latin American and the Caribbean, there are signs that norms of filial obligations are beginning to erode. We show this in the section on residential arrangements.

A.4.4. Composition by social class: the importance of education

The study of aging by social classes or social strata involves two different but interrelated issues. The first is the degree to which the aging process proceeds along different lines by classes or social strata. The second is the current (and future) composition of the elderly by class or social strata.

i. Social class differentials in the aging process

To the extent that there are marked differentials by social strata in mortality and fertility, one would expect the aging processes experienced by different social classes to be different. Populations in lower social strata generally experience higher levels of fertility and should be characterized by correspondingly younger age distributions. However, as a norm their demographic transitions are sharper, with less gradual and more precipitous fertility and mortality declines than in higher strata. This suggests that the speed of the aging process, as measured by changes in A(t) or R(t) could eventually be faster for lower social strata. This remains an approximation only for we do not account for a key process: social mobility. Classes or social strata are not tightly bounded and some social mobility between strata is always allowed, even in the most rigidly stratified society. A great deal of research in the developed world suggests that fertility and mortality of socially mobile individuals resembles more the social strata of destination than the social strata of origin. The final effects of social mobility, however, will also depend on the age pattern of mobility itself and on its trend over time. If social mobility occurs during relatively young ages (say between 20 and 50) and has increased over time, the ultimate effects on the age structure of the strata of origin will be to siphon off youth but simultaneously deplete the sub-population with lower fertility. These two factors will have offsetting effects on the age distribution of the lower strata. The effects on the social strata of destination, however, will be more complicated as the short term effects will be to make the age distribution younger but as the new elements age, it will introduce a force toward more rapid aging. The operation of these forces leads to a complicated scenario. We suspect, however, that the following is true: at the outset of the aging process (say around 1970), higher social strata may have experienced more aging that lower social strata. As the process advances and moves toward the year 2020 the aging process will proceed more rapidly among members of the lower social strata for precisely the same reasons that account for differentials (and their trajectory over time) between countries in the region and other developed countries. Regrettably, none of these propositions, however, are directly verifiable since data on the age composition of different social strata over time or even at one point in time are unavailable or are unreliable.[3]

[3] One possibility is to study the age distribution (and its changes over time) of groups defined by educational attainment. This presents a number of difficulties, not the least of which is that educational attainment itself changes meaning over time and across generations so that it can hardly be taken as a fixed indicator of social strata.

ii. Distribution of elderly by social class

A more feasible operation with the data available to us is to assess the composition of the elderly population by social class or strata. Information about the fraction of the elderly population who live in conditions of poverty, for example, is a very useful indicator to design fiscal instruments or social policies to safeguard minimum levels of living among the elderly. The distribution of the older population by social strata or classes is, as before, a function of the magnitude and direction of fertility and mortality differentials, the magnitude and direction of social mobility and, in addition, of the distribution of the total population by social strata. Because in most societies of the region the large majority of the population belongs to lower social strata, the distribution of the elderly will also be biased toward lower social strata. The interesting question is whether such bias is reinforced (or attenuated) by differentials in the demographic regimes or by social mobility. To the extent that lower social strata experience higher fertility and mortality, the fraction of older people who belong to these strata will be lower than in the general population. This should be reinforced by a social mobility regime where fertility and mortality of the upwardly mobile resemble more closely those of the social strata of destination. This argument, however, neglects the fact that some social mobility at least is age related. In particular, it does not take into account downward mobility that occurs as a consequence of old age, or that associated with statuses such as widowhood. By and large, it is believed that attaining older ages is more likely to lead to a loss of means and resources, and to an increase in the share of elderly belonging to lower social strata.

In sum, the forces shaping the distribution of the elderly by social strata tend to have mutually offsetting effects, and whether or not lower social strata contribute disproportionately to the absolute size of the elderly population will depend on the empirical manifestations of these forces in a given society.

We have access to only one crisp indicator of social class that occasionally can be traced over time, namely, levels of education. Although education is correlated in the cross section with income and assets and can, therefore, be used as an indicator of class or social strata, it is subject to a number of pitfalls. First, cohort trends in educational attainment could be interpreted erroneously as evidence of upward mobility. Second, for reasons discussed above, levels of education are not strongly correlated with wealth and assets over the life cycle: individuals may lose sources of income as a function of older age, regardless of education or socioeconomic

attainment. Thus, increased levels of education among the elderly over time cannot be taken as *prima facie* evidence of a shift of the distribution of the population by social strata. However, high prevalence of low educational attainment among the elderly will surely reflect an unfavorable distribution by social strata.

With these caveats in mind, Table 6 is useful to gauge the extent of the problem. These figures reveal the composition of the elderly by literacy levels in a number of countries in the region around 1990. The cross-national disparities in levels of literacy among those 60 and older are very large, much larger than the disparities in levels of literacy in the total population. Since during the Post-World War period most countries experienced increased levels of literacy, the cross-country variance that we will observe when younger cohorts reach older ages in the first quarter of the 21st century will be lower than the one in the table. The figures for Mexico illustrate the likely profile of future trends. The absolute drop in the proportion of elderly who are illiterate between 1970 and 1990 is of the order of 17 percent. This should reflect increased literacy over the period 1890-1920 and 1910-1940. Since the push for literacy in the continent in general, and in Mexico in particular, acquires more salience after 1940, the drop in the proportion of illiterate among the elderly will be much larger between 1990 and 2025 than it was in the past. Thus, we should expect that by 2025 the fraction of illiterate elderly will be lower than 22 percent, and more likely in the range 10 to 15 percent. Countries such as Argentina, Uruguay and Chile will experience even lower levels, probably below 5 percent. Finally, a handful of countries where the drive toward educational equality was less aggressive (Peru, Ecuador, Bolivia) will experience levels in the range between 20 and 30 percent.

To the extent that illiteracy among the elderly does reflect poverty, these figures point in two directions. First, they indicate that the prevalence of poverty among the elderly will be highly heterogeneous across countries, thus requiring sharply different policy approaches. Second, countries in the region will experience rapid aging under conditions that guarantee high levels of poverty among the elderly, much higher than the levels experienced by developed countries at similar points in their trajectory toward an older age structure. A different way of saying this is that aging in countries of the region will occur relatively earlier, during a time when general levels of well-being among the population have not yet reached levels reached elsewhere. Again, this suggests the need for policies very different from those that are appropriate in developed societies.

[Table 6 about here]

A.4.5. Rural-urban residence

As in the case of social classes we ask two different questions. The first pertains to differentials in the process of aging as they affect urban and rural areas. The second is about the composition of the elderly population by rural-urban residence.

i. Rural-urban differentials in the aging process

The large scale rural-to-urban migration flows that characterized most countries in Latin America and the Caribbean in the Post-World War II period had long lasting influences on the age distribution of each area. To the extent that rural-to-urban migration is a strategy employed by those who are young and still active in the labor force, **current** age distributions in rural areas will be biased toward older people. The bias, however, is likely to be more than offset by the powerful influence of much higher fertility levels in rural areas. The momentum toward older age distributions in urban areas is reinforced by their more rapid fertility and mortality decline and, more importantly, by the attenuation of rural-to-urban migration flows. The same population who migrated in their youth several decades ago will boost the rate of growth of the urban elderly, and the very forces that injected a large youth component to the urban populations will become an important source of rapid aging.

[Table 7 about here]

Columns 1 through 4 in Table 7 display the proportion of the population above age 60 in urban and rural areas for countries in the region at two points in time, 1980 and 2025. With a handful of exceptions urban areas have, at the outset, an older age structure (as reflected by C(t)) than rural areas. The situation will be reproduced in 2025 as aging proceeds more rapidly in urban areas thus widening the rural-urban age structure gap. But, does more rapid urban aging translate also into rapid concentration of the elderly in urban areas?

ii. Distribution of elderly by rural-urban residence

Barring future migratory flows drawing urban elderly back into rural areas, the fraction of elderly living in urban areas will increase steadily. Whether or not the pace of growth of the

urban elderly is faster than the pace of growth of the urban population will depend on a number of conditions. Columns 5 through 8 in Table 7 display the proportions the total elderly population and of the total population living in urban areas for year 1980 and 2025 respectively. The ratio of column 6 to column 5 will exceed 1 whenever the rate of growth of the urban elderly surpasses the rate of growth of the total elderly population. This represents the case when there is increasing concentration of elderly in urban areas. As is evident from a comparison of columns 5 and 6, all countries experience ratios higher than 1. Similarly, the ratio of column 8 to column 7 will exceed 1 whenever the rate of growth of the urban population is higher than the rate of growth of the total population. This represents the case when there is increasing concentration of the population in urban areas. As before, a comparison of columns 8 and 7 reveals that in all cases the ratios are higher than 1. The last column of the table assesses the speed of urban concentration among the elderly relative to the speed of urban concentration in the total population. When the figures in this column exceed 1, the speed of concentration in urban areas among elderly is faster than the speed of concentration in the total population. This can occur in two very different cases. The first case includes societies where the aging process is in its inception, and the effects of past mortality declines and rural-to-urban migration flows begin to be felt in urban areas. This includes, for example, Bolivia, Peru, and Dominican Republic. The second case includes societies that experience heavy rural-to-urban migration of elderly people. We do not think that there is evidence to associate any country in the region with this scenario. Countries where the index in the last column of Table 7 is below 1 includes two different cases. First are countries where the forces producing aging are running out of steam and the rates of growth of the elderly population begin to approach the rates of growth of the rest of the population. This includes Argentina, Costa Rica, Cuba and Uruguay. The other case includes countries where there is still a process of heavy rural-to-urban migration that powers increased concentration of younger individuals in urban areas. Paraguay is a good example of this pattern.

We are not aware that any of the above regularities represent patterns unseen in more developed countries experiencing rapid aging. However, there is an important difference that deserves a comment. This is that the fraction of elderly living in the more backward rural areas of the region is substantially higher than expected if the patterns experienced in Western Europe or North America applied to Latin America and the Caribbean. In fact, most developed countries in the midst of an aging phase are very highly urbanized, and the elderly population is heavily

concentrated in urban areas. Indeed, in all cases more than 90 percent of the elderly live in urban areas. This does not occur uniformly in Latin America and the Caribbean. With a handful of exceptions, most countries in the region are projected to have between 15% and 40% of the total elderly population in rural areas, even though the mean age of these countries already qualifies them as having an older demographic regime. These values are much higher than they would have been had these countries followed patterns prevailing in more developed countries.

The challenges that this phenomenon presents can only be hinted at since the problem has never been dealt with before. First, there is a question of what the health and functional status of the elderly in rural areas will be, and the consequent pressure they will exert on demand for health care services. There are a number of reasons that could account for a distribution of elderly by health status that is worse in rural than in urban areas, and one of them is the well-known insufficiency of health care services offerings. Similarly, rural elderly belong to cohorts who experience much harsher conditions during early life than those in urban areas. Not only were levels of nutrition substantially lower, but they were also exposed to a more severe disease environment. If there is any truth to the argument that early conditions affect health conditions in adult life (Barker, 1997), rural elderly are likely to have worse health and disability status than urban elderly. Secondly, rural populations are integrated into fragile labor markets and individuals there experience occupational careers lacking efficient mechanisms to transfer wealth over the life cycle. If so, the elderly in rural areas will participate only marginally in public programs of income support and not at all in existing private schemes. Third, to the extent that traditional household organization and networks of kin exchange are eroded by rural-to-urban migration, alternative sources of social, economic and emotional support for the elderly will be less available in rural than they are in urban areas. On all three counts then, one should expect that conditions in rural areas could be worse than in urban areas. If this is combined with much higher proportions of the elderly living in rural areas, one can see why the region may face serious difficulties in trying to maintain minimum levels of welfare.

B. The health dimension

Aging societies face important dilemmas but none of them is as salient and consequential as the health conditions of the elderly. Although there are other relevant dimensions, health care expenditures are by far the largest component of transfers toward the elderly (Wise, 1997). The level of these expenditures and their projected trajectory in the near future are of paramount

significance for the adequate design of health policies and for realistic appraisals of the strength and weaknesses of pension and welfare programs (Wise, 1997; Lee and Tuljapurkar, 1997). The actual magnitude of these expenditures will be a function of several variables, some of which are simply beyond the control of policy makers. First and above all, there must be some societal level of 'desired welfare' or expected level of well-being that, to some extent at least, all policies will reflect. This is partially under the control of interest groups, and the private and public sector. Given a desired level of well-being, health costs and health expenditures will depend on the health profile of the elderly and on the mix of technologies deployed to maintain or improve health conditions. Of these two components, the best known to us is the health status of the elderly.

To understand the determinants of elderly health status we begin with a simple representation of various states that define health conditions an elderly person can experience. This is illustrated in Figure 5. An individual at any age x can occupy one of three states: healthy (state 1), with chronic illness (state 2) and with functional disability (state 3). Death is an absorbing state (state 4).[4]

[Figure 5 about here]

In this simple representation there are a number of possible transitions: those from state 1 to state 2 and back, from state 2 to state 3 and back, and from states 1, 2 and 3 to state 4. At any given time, the prevalence of chronic illness and disability among the elderly will depend on the timing of onset of illnesses and disability, on the relative magnitude of the recovery rates from chronic illness and from disability, and on death rates. In the absence of other changes, a decline in death rates among those in states 2 and 3 will translate into increases in measures of prevalence of either chronic illness or disability. This simply means that to the extent that medical technology is successful in postponing death, the size of the demand for support and health care will increase. By the same token, if behavioral changes are successful in delaying the onset of some chronic illness or of associated functional limitations, the size of the demand for health care will decrease. Finally, if health care and treatment technology improves, recovery

[4] A more complicated representation would include a state for confinement in health care facilities (hospitals, clinics) and in institutions for the disabled.

rates from chronic illnesses or disability will increase and lead to corresponding reductions in measures of prevalence. Thus, the key elements affecting the health status profile of the elderly are mortality rates, timing of onset of chronic illnesses and disability, and rates of recovery.

What do we know about mortality rates, onset of chronic illness and disability, and processes of recovery? What do we expect about their trajectory in the near future, in light of the influence of behavioral changes, possible innovations in treatment, and new prevention strategies?

The answers to these questions are not simple as there is no clear agreement on one fundamental issue: the nature of senescence. On the one hand there are those who claim that improvements in life expectancy have a ceiling which cannot be pierced at all by medical technology since it is rooted in evolutionary forces and genetic make up (Fries, 1980). According to supporters of this position, medical technology can only postpone the onset of illnesses and disability, compressing the occurrence of ill-health and functional disability against ages close to the upper limit of the life expectancy. This will induce what is known as a "rectangularization" of the curves of morbidity and mortality. In this view, the primary forces that will determine the health profile of the elderly at any one time are related to timing of onset of illnesses and disability.

In contrast, others argue that there are no inherent limits to life expectancy, and that the profile of elderly health will depend on the timing of onset of illnesses and disability as well as on rates of recovery (Singer and Manton, 1994; Manton, 1982). The argument is that prevalence of chronic illness and disability may be variable, and that prevalence rates will involve a wide range of ages, rather than being significant only in the upper tail of the life span. As a consequence the outcomes for elderly health status are less certain: delayed onset in the absence of significant increases in mortality may translate into large increases in prevalence of chronic illness and disability at older ages, thus affecting negatively the values of active life expectancy (ALE).[5] A third hypothesis is that improvements in survival and associated increases in life expectancy at older ages are likely to be accompanied by higher prevalence of morbidity, a combined result of changing composition by frailty among survivors (Vaupel, 1979), and the effects of insult accumulation over the life time (Alter and Riley, 1989).

[5] ALE refers to the average number of years of life expected to be lived without illness or disability.

Where do countries of the region stand against this background? And what are the most likely trajectories that the health profile of the elderly may follow?

B.1. Improvements in mortality

B.1.1 Trends in e(60)

We begin with an examination of trends in life expectancy at age 60 and compare them with those experienced by more developed countries. Table 8 displays estimated life expectancies at age 60 and the probabilities of surviving up to 60 for three different periods of time. Figure 6 shows yearly values of E(60) for selected countries during the period 1970 to 1995. Note that in virtually all countries the values of E(60) in the period 1990-95 get very close to 20 years, and compare favorably with estimates for Japan and the US. It is unclear, however, the extent to which these values are affected by age-overstatement at older ages which leads to downward biases in mortality rates and to overestimates of life expectancy particularly at older ages (Grushka and Preston, 1995; Dechter and Preston, 1991). Evidence of overstatement can be seen in Table 8 when S(60) and E(60) are jointly compared. If this is done, it is clear that some countries have very high values of E(60) **relative to the values of S(60)**. For example, Guatemala is projected to have S(60) around .83 and E(60) of about 20.8. However, a similar value of S(60) in Japan (for 1960-65) is associated with a much lower value of E(60). This phenomenon is consistent with the idea that estimates in Table 8 may be contaminated by age overstatement. Less plausible is an explanation that invokes unusual age patterns of mortality.

[Table 8 about here]

[Figure 6 about here]

The plot in Figure 6 is less likely to be affected by age overstatement since, with the exception of Guatemala, it displays data for countries with relatively good statistics, and does so for a long series of years, all of which may be equally affected by age overstatement. Thus, the **relative changes** observed in the figure are less likely to be influenced by errors. The graph conveys the idea that, initially at least, improvements in E(60) proceed at a relatively rapid pace, but that there is a considerable slow-down during the last decade. In fact, in the case of Cuba there is evidence for outright deterioration. It is not clear whether or not the slow-down is a result

of forces that govern processes of senescence or, alternatively, a peculiar feature of countries in the region.

As shown in Table 8, countries with the best quality statistics (Chile, Cuba, Barbados, Jamaica and Trinidad) have E(60) at or near 20 in 1990-1995 whereas projected values for 2020-25 are between 20 and 23, very close to those applicable to the US (22.0) and Japan (23.2). It seems reasonable to assume that most other countries in the region will move toward similar levels in the near future. It is also clear that future progress above age 60 will be increasingly harder to achieve whereas improvements in survival to age 60 are already near saturation. Barring any future increases in mortality, a newborn will be expected to live about .95*20 or 19 years of life above age 60. In 1950-1955 the corresponding number was, on average, around .63*15.8 or 9.95 years. Thus, the changes in mortality packed in the fifty or so years after WWII translates into an excess of about 9 years of life. The question is how healthy will these years be? What kinds of health care costs are likely to be associated with extra years of life to be lived above age 60? Answers to these questions require information on trends in health status, a dimension about which we know very little. We can, however, indirectly infer what the trends have been by examining causes of death statistics.

B.1.2. Changes in causes of death

In societies with high quality data, statistics on causes of death reflect the combined results of illness prevalence and case fatality rates (see Figure 5). These data, however, cannot be used to make inferences about the timing of onset of illnesses nor can they unambiguously suggest trends in recovery rates. They are thus not the best tools for illustrating the empirical operation of the multistate system portrayed in Figure 5. At the very least, however, changes in age patterns of causes of deaths and in the distribution of death by causes provide some information about the changes in morbidity regimes. It is well known, for example, that as societies cease to be dominated by a traditional demographic regime and approach a more advanced one, with life expectancies above 50 or 60, the most important causes of deaths shift from infectious to non-infectious conditions (Caldwell and Caldwell, 1991; Frenck et al., 1990; 1991; Omran, 1982; Murray et al., 1992; Palloni, 1985). This reflects the combination of several processes, including less exposure and higher resistance to infections as well as higher rates of recovery and greater exposure to chronic illnesses. Statistics on causes of deaths cannot directly reveal the prevalence of different conditions at any point in time, and thus cannot be used to

estimate the load of illnesses among the elderly. However, these statistics are a coarse indicator of the broad morbidity regime to which societies are exposed.

The bar graph in Figure 7 displays the mortality rates at ages 60+ by groups of causes of death in selected countries of the region at two points in time, 1970 and 1990.[6] Figure 8 displays the same rates every five years between 1970 and 1990 for countries with the best quality statistics. These figures reveal a pattern already verified in developed countries, namely, a gradual decrease in death rates due to infectious diseases and an increase in death rates due to some chronic conditions. At least in the most advanced countries in the region we see a pattern observed in developed countries after 1960-1970 (Horiuchi, 1997), namely, one with diminished importance of cardiovascular diseases. These patterns are confirmed in Table 9 displaying estimates of the contribution of changes in cause of death-specific rates to absolute changes in life expectancy at age 60+ between 1970 and 1990. In countries well advanced in the mortality transition, these estimates confirm that most of the gains in survival after age 60 are associated with decreases in mortality among the relatively young (ages 60 to 69), and with three leading causes of death, namely, infections, diseases of the respiratory system, and cardiovascular diseases. Countries that are further back in the mortality transition, such as Guatemala, still reveal the heavy influence of respiratory TB and other infectious diseases, as well as the growing negative effects of neoplasms and cardiovascular diseases.

[Table 9 about here]

[Figure 7 about here]

[Figure 8 about here]

Despite obvious similarities in the course of mortality changes among elderly in the region and elderly in developed countries, there are some important differences. Perhaps the most salient among them is the existence of a pattern of causes of deaths that is more heavily influenced by infectious diseases. That is, for a given level of life expectancy at age 60, countries of the region are more likely to have higher mortality rates associated with infectious diseases

[6] Only a handful of countries in the region possess reliable statistics on causes of deaths. In most cases, changes over time are confused with changes in coding practices, increases in coverage and increases in the proportion of deaths that are certified by physicians. The countries in the table are those with the most robust information available and hence least likely to be affected by artifacts.

than more developed countries (Palloni and Lu, 1995). There are a number of reasons that could explain this pattern, some of which do not reveal real processes but artifacts in the classification of causes of deaths. It is possible, however, that elderly in the region are more exposed or less resistant to infectious conditions than elderly elsewhere. The typical morbidity regime in the region is characterized by a blend of infectious and chronic conditions combined in an unusual, unprecedented way that must surely exert a powerful effect on the distribution of elderly by health status and by health care needs.

B.2. Measures of current health status

An important issue raised by progressing aging of societies is related to the quality of life of the elderly. If the elderly population not only is growing faster than ever before (see Section A.1) but is also living longer than ever before (see Section A.2), to what extent is the composite increase of person-years lived in old age dominated by person-years lived in good health? Some authors have argued that increases in life expectancy lead necessarily to increases in the proportion of time lived with disability or ill-health (Riley, 1990; Alter and Riley, 1989). Others have argued the opposite either by showing empirically that, in some countries at least, there has been a gradual but very noticeable improvement in morbidity and disability among the elderly (Crimmins et al., 1994; Crimmins et al., 1997; Manton et al., 1993) or, alternatively, by pointing to the relativistic nature and hence intrinsic inaccuracy, of notions of ill-health (Johansson, 1991).

The only source of information about health conditions among the elderly in the region is a multi-country study carried out during the eighties and coordinated by the Pan American Health Organization. Aside from preliminary reports, these data were never fully analyzed or compared with data sources from other countries. Although the individual data files are no longer accessible, it is possible to reconstruct several indicators of health status from published preliminary reports. We examined several items, including self-reports on chronic conditions and Activities of Daily Living (ADL's) but, in the end, we chose to focus on self-assessed health status. For a number of reasons this is the only indicator that is comparable across all data sets, as well as the only one that provides useful variability across countries in the region. Table 10 displays the percentage of sample population aged 60 and above reporting their health in various categories in a continuum from 'bad' to 'very good' or 'excellent'. Although age distinctions would have been desirable, sample sizes do not permit us to compute reliable age-specific

estimates. The table also includes comparable percentages calculated from the HRS and AHEAD, two of the most important data sources on the elderly in the US. The figures are calculated by gender and, in the case of the US, by ethnic group also.[7]

[Table 10 about here]

While self-reported health status is not an ideal indicator of health conditions, it can be shown that it is remarkably accurate and a very good predictor of subsequent ill-health and mortality (Idler and Kasl, 1991; Idler and Benyamini, 1997, Mare and Palloni, 1988). Three features stand out in the table. First, in all countries of the region the fraction that reports not being in good health status ('poor' or 'fair') is two to three times higher than comparable figures for the White population in the AHEAD study. It should be remembered that the sample studied in AHEAD corresponds to an older age bracket (70+), whereas those of the HRS correspond to a younger age bracket (51-61). Thus, in the US the fraction of the White population reported to be in poor/fair health condition is 33.5% among males and 34.0% among females. In Argentina the corresponding numbers are 38% among males and 53.8% among females. In all other countries the percentages are much higher, from around 55.3% among males in Colombia to about 86.0% among females in Jamaica. As would be expected, the comparison is more favorable if one takes as reference the US Black population. But even then only Argentina seems to fare better. Second, the heterogeneity within the region is substantial and appears to be only weakly correlated with mortality levels. Thus, the lowest percentage reported to be in average or worse health conditions occurs in Argentina (37%-53.8% for males and females) while the highest occurs in Venezuela (82.7%-77.3% for males and females). Third, there are very large gender disparities and, with the exception of Venezuela, all of them favor males. The differences can be as large as 15.2 percentage points in Argentina and as tenuous as 1 or 2 percentage points in El Salvador. It should be noted that in the US and other developed countries the male-female differences are insignificant or present the opposite pattern, namely, one whereby female report themselves in

[7] In order to maximize comparability, we collapsed the 'very good' and 'excellent' categories used in HRS and AHEAD. The resulting group is comparable to the category 'very good' used in the PAHO sponsored study. We also assumed that the category 'fair' used in AHEAD and HRS is comparable with the category 'average' used in the PAHO-sponsored studies. Finally, the data reported in five of the eight countries in the region, (Brazil, Colombia, El Salvador, Jamaica, and Venezuela) did not make a distinction between 'poor' and 'average' or

better health conditions than males. If these gender differentials reflect unobserved differentials in underlying health conditions, the patterns are ominous. Indeed, as suggested before and as stated before, elderly women are at least at higher risk of experiencing worse economic conditions than elderly males. The combination of worse health status and standards of living for elderly females does not bode well for countries where the gender disparity in survival creates a larger population of dependent elderly women than of elderly men.

B.3. Where does the future lead?

The information analyzed before is too sparse to provide strong indications of even short-term future trends of mortality or health status in the region. There are a number of features, however, that deserve to be singled out and reserved for careful scrutiny.

B.3.1. How far can E(0) and E(60) go?

As we will see later, one of the most important elements in the calculus of solvency of social security systems is the forecasted value of life expectancy. The increases in years lived induced by further improvements in survival will be disproportionately allocated at ages above 60 (Lee and Tuljapurkar, 1997). This is the reason why even minor increases in life expectancy can induce very large budget deficits that must, in one way or another, be eliminated. Survival in the region is likely to be improved, and an increase in life expectancy at birth to levels above 70 in all countries is not a farfetched goal. It is not clear, however, what will the pace of these increases will be in general, and for ages above 60 in particular. Current projections (see Table 8) indicate that by 2025 we should expect values of E(60) well in excess of 18 years, and in most cases at or slightly above 20 years. Will mortality decrease even further? If countries in the region were to follow the path already traced by Western European countries, we could expect decreases in the rates of mortality above age 70 or 80 of about 1 percent per year (Kannisto, et al., 1994). If applied to ages above 60, these changes will induce changes in life expectancy at ages 60+ of more than .20 years per year when levels of life expectancy at age 60 are of the order of 20 years. Extrapolations of this sort are fragile since they rely on assumptions about comparable medical technology and innovations, conditions of population exposure, and frailty composition of the various cohorts that are unlikely to be verified.

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between ‘good’ and ‘very good’. Therefore, in order to compare all countries we ought to merge ‘poor’ and ‘fair’ on the one hand, and ‘good’ and ‘very good’ on the other.

There are reasons to suspect that the course of mortality decline in the region may be somewhat more hazardous than it ever was in developing countries. For one thing, it is likely that the demand for health care emanating from the elderly population will be greater than what was or is experienced in developed countries. In part this is due to the nature of the cohorts reaching old age between 1990 and 2030, but in part it has to do with the peculiar combination of infectious and chronic conditions characteristic of most countries in the region. Furthermore, we know all too well that standards of living in most countries of the region lag behind the standards of living in developed countries. To the extent that the quality of health care fueling the mortality decline at older ages in other areas of the world is totally or partially absent in Latin America and the Caribbean, there is little reason to expect similar mortality declines to follow. And even if it were similar, there will be considerable lags mediating the process. This suggests that unless special action is taken, additional gains in survival at older ages among elderly in the region will be a tough goal to attain within the short to medium run.

B.3.2. What will health conditions be like?

The above considerations eschew the important issue regarding the actual health conditions of the elderly population. If it is true that additional gains in survivorship are possible, it is not at all clear that the added years of life will be healthy ones. In fact, we argue that the opposite is as likely to occur. To show it, we can introduce a simplified model. Suppose that there are two subpopulations, one with good access to health care services (subpopulation 1) and another with poor access (subpopulation 2). Assume that in a period of k years there is an across the board increase of one year of life to be lived above age 60, that is, the increase is shared by both subpopulations. The fraction of that extra year of life that will be lived in good health depends on three factors: (i) the allocation of the extra year across ages above age 60 in each of the two subpopulations; (ii) the age-specific fractions of the extra year that will be lived in good health; and, (iii) the population distribution across the two subpopulations. More precisely, the fraction of the additional year of life to be lived in good health, $)H$, is

$$)H = \pi_1 * E_x((_{1x} ** _{1x}) + \pi_2 * E_x((_{2x} ** _{2x})$$

where π_1 and π_2 are the fractions of the population belonging to subpopulations 1 and 2 respectively ($\pi_1+\pi_2=1$), $(_{1x}$ and $(_{2x}$ are the age specific allocations of an extra year of life

expectancy above age 60 in subpopulations 1 and 2 respectively, and π_{1x} and π_{2x} are the age-specific fractions lived in good health in subpopulations 1 and 2 respectively.

i. The nature of π_x and γ_x

Since the force of mortality above age 60 rises exponentially, an increase of 1 year of life above age 60 will be disproportionately allocated among older ages. This implies that γ_x is an increasing function of age. Since the evidence available to us suggests that π_x is a decreasing function of age, the allocation of an extra year of life expectancy will contain a bias toward ill-health. Thus, barring the existence of compensating influences, further increases in survival should translate into an increase in the fraction of years lived in ill health or disabled.[8] Assuming that γ_{x1} and γ_{x2} are equal may not be accurate but deviations from it will not cause great damage to our conclusions. This is because differences in π_{1x} and π_{2x} are likely to dominate over other differences. Indeed, social differentials in π_x are likely to be large and persistent.

ii. The nature of differentials in π_x

The quantities π_x are largely a function of two conditions. The first is the composition of the population at age x according to risk profiles, and the second is a measure of effects of access to and use of health care services, and should be a straightforward outcome of actual access to satisfactory health or medical care. It will be lower for populations which have limited access to health or medical care and higher elsewhere.

The first condition is a complex result of three factors: early childhood exposure (perinatal, growth and development during first five years), behavioral risk profiles (smoking, drinking, diet; exercise), and past purchase of health inputs (as reflected in occupation, education, and assets). Although we know a fair amount about the effects of each of these factors on health status and mortality, we know virtually nothing about their prevalence in populations of the region. The only string of evidence available pertains to the composition of the cohorts who will begin to attain their 60^{th} birthday after the year 2000. As mentioned before (see Section A.2.), the bulk of the increase in this age group is associated with mortality decline in early childhood during the decades following WWII. These cohorts will be increasingly dominated by individuals who, during their early childhood, may have been exposed to conditions or infectious diseases that would have been fatal several years before. To the extent that exposure to and

contraction of conditions early in life have a physiological effect that will play out only many years later (Fogel, 1986; Fogel and Costa, 1997; Barker, 1997), we should expect that the health status of the corresponding cohort will deteriorate, that is, the values of $*_x$ will decrease. Since these effects are likely to be stronger among populations that are more vulnerable or that have less access to adequate health services, and since availability of health care services is highly correlated over the life cycle of an individual, we expect that $*_{1x}$ will be higher than $*_{2x}$.

iii. The nature of $"_1$ and $"_2$

These quantities depend on the distribution of health care services in the population. In countries where an important fraction of the elderly live in rural areas or in poor urban settings, are exposed to conditions with little if any access to satisfactory health care facilities and to mediocre informal care, the values of " will place more weight on conditions that dictate lower values of $*_x$. If reforms in the public sector, the wholesale revamping of pension systems, and trends in labor force participation lead to a continuous shrinking of the access to health services available to poor or marginally poor elderly, the problem will be aggravated and more weight will be assigned to the population with poorer health status or lower values of $*_x$.

iv. An illustration: the case of respiratory TB

A concrete illustration may help to place these considerations in perspective. It is well known that the prevalence of respiratory TB (latent) among adults in Latin America is fairly high (Sudre et al., 1992). Due to the introduction of BCG in the late forties and to improved exposure conditions, it is very likely that prevalence of latent TB increases with age, and that it is among the oldest cohorts where we will find higher prevalences. It is also known that respiratory TB is one of the most sensitive diseases to changes in nutritional levels (Lunn, 1991; Livi-Bacci, 1991; Palloni and Hill, 1997). Reductions in nutritional intake can produce effects in immune function that trigger short run activation of the disease among individuals who are TB+. Combining these two known facts we can suggest that if the elderly population in the region experiences social and economic deterioration, there will be increases in **active** respiratory TB and consequently of its rate of transmission. We do not know what is the nature of the interaction between respiratory TB and chronic conditions nor do we know much about their joint influence on functional limitations. But it surely must be the case that increases in active TB will not improve health

[8] This argument holds even if the force of mortality begins to rise at decelerating rates past certain ages (Horiuchi and Wilmoth, 1998). For the purposes of this argument only we assume that the distribution of years of life by

status and disability among the elderly afflicted by it. In this illustration, an increase of one year of life after age 60 generated, for example, by improvements in the treatment of congestive heart disease, that is unaccompanied by parallel improvements in nutrition among poor elderly will not translate in a proportionate increase in healthy life.

The foregoing considerations suggest that future increases in life expectancy above age 60 in countries of the regions are unlikely to be accompanied by corresponding decreases in the prevalence of ill-health. A more likely scenario is one where an increasing fraction of years of life gained are spent in disability or ill-health. Since this conclusion is not based on examination of empirical data but on inferences drawn from examination of basic relations, it should remain as very speculative.

C. Labor force dimension

A recurrent theme in this report is that despite the existence of broadly similar demographic aging profiles in the region and among developed countries, there are equally salient contrasts. None of them is, however, as visible as the relation between the speed and size of the momentum towards aging, on the one hand, and the social and economic contexts of the societies where the process is taking place, on the other. Most countries of the region were recently exposed to a drastic and costly process of adjustment in response to a prolonged and deep economic recession (‘debt crisis’) that, though having its roots in the world economy, engulfed the economies of virtually all countries in Latin America and the Caribbean. This recession was only the most visible part of a more entrenched, regular, and durable process of economic deterioration. This process is characterized by low rates of increases in GDP per capita, high rates of inflation, high levels of unemployment, large fractions of national budgets servicing foreign debt, and decreasing financing of new investments in infrastructure and capital depreciation. Although these are all trends for aggregate outcomes, they have important consequences at the individual level as well. In particular, the bulk of the population has experienced a sustained decreased in real income, poorer access to health services and erosion of their capacity to claim public sources for retirement and welfare (Marichal, 1989; Altimir, 1984). The elderly and children are the most vulnerable groups to the onslaught of these trends. The bulk of the elderly population depends on public support as their source of income, normally in the form of government sponsored social security benefits or as cash payments from private and

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health status is independent of gains in survival.

semi-private pension funds. As fiscal policies become more draconian, a preferred target has been a shrinkage of the size of benefits for the elderly, either through below-inflation rate adjustments or via the curtailment of associated services, particularly health care.

In the face of these trends, there are two and only two compensatory mechanisms that can be deployed to maintain or increase quality of life of the elderly. One of them is to resort to support from families and kin in the form of shared residential arrangements or through persistent flow of exchanges involving goods and services. The other mechanism is an increase in the labor force participation of the elderly. If these mechanisms are not fully utilized or if they are inefficiently implemented, the net result will be a deterioration of well being of the elderly, particularly among elderly women. In the next section we will examine regularities associated with the first of these two mechanisms. In what follows we devote attention to trends in labor force participation among the elderly.

A distinct and unmistakable trend in developed countries is the continuous and gradual decrease in labor force participation among elderly individuals. For example in the US, rates of labor force participation among men aged 55 and above dropped from about .69 in 1950 to about .39 in 1990, at an annual rate of decline of about .008 per year. A recent survey involving about 50 countries (Kinsella and Taeuber, 1993) reveals that among developed countries labor force participation rates among those aged 65 and over range from less than 2 percent in Austria to about 24 percent in Norway. The patterns in developing countries in general and in the region in particular could not be more different (Clark and Anker, 1990). First, rates of male labor force participation are much higher in Latin American and the Caribbean than they are in the US and other developed countries. Secondly, although there is a downward trend in rates in the region, this is not as sharp and marked as the one observed in the developed world. This is shown in Table 11a, which displays estimated rates of labor force participation in the population 65 and over.[9] Note the very large heterogeneity in the region, including countries such as Uruguay where rates are below 25 percent, and countries such as Guatemala where rates exceed 65 percent. The rates of decline in labor force participation are also very heterogeneous, with countries such as Mexico exhibiting a rate of decline larger than 1 percentage points per year, and countries such as Guatemala and Peru where there is scarcely any change at all. Gender

[9] To maintain comparability with estimates from other sources we have departed from our convention of examining the age group 60 and above and have instead returned to focus on the more habitual definition of elderly population.

differentials are also very sharp, as in most cases older females stay out of the formal labor markets altogether without there being any indications of a trend reversing the situation. This, in turn, is another point of contrast between countries in the region and the US and other developed countries.

[Table 11a about here]
[Table 11b about here]

The data in Tables 11a and 11b as well as information from other sources suggest a cross-country and over time correlation between availability and coverage of pension systems and rates of labor force participation. Indeed, countries where the social security system is more advanced and where coverage is more extensive, Argentina, Chile, Cuba, and Uruguay, are also countries with the lowest rates of labor force participation among older men. This relation has been also noted by researchers examining larger data bases that include developing and developed countries (Kinsella and Taeuber, 1993; Martin and Kinsella, 1994; Clark and Anker, 1990). Moreover, the relation is consistent with four additional empirical regularities. First, in countries of the region and other developing countries the labor force participation rates among the elderly in rural areas is higher than among those living in urban areas (Pelaez and Arguello, 1982; Martin and Kinsella, 1994). Throughout the region as well as in most developing countries, rural workers are also less likely to be covered by any retirement benefits. Second, the proportion of non-active elderly population that does not rely on pensions or retirement funds increases sharply as the strength of the social security and pension systems decrease (Pelaez and Arguello, 1982). Third, the number of hours worked by elderly who are part of the active population are high enough to suggest motives other than working for recreation. Fourth, and finally, in all countries of the region there is a very sharp gradient of labor force participation by education, with those who are highly educated being much more likely to be out of the labor force altogether. This is shown in Table 11b for males aged 60 and over for the period 1970-80. This regularity is likely to be associated with increased coverage of pension plans among the more educated segment of the population.

Altogether this evidence can be interpreted as supporting the idea that individual retirement decisions are tightly related to access to retirement or pension funds and associated

benefits, and that continued labor force participation reflects economic needs. One potentially important policy consequence is that to the extent that availability of pensions shrinks or associated benefits become more constrained, we will see an increase in the rates of labor force participation rather than a decrease. But this reasoning may turn out to be erroneous if labor market conditions or the health status of elderly are less than advantageous.

Although it is widely believed that the secular downward trend in the US is due to more ready access to sources of income associated with welfare of all types (Parsons, 1980), recent research with HRS and AHEAD indicates that retirement (including early retirement) is strongly affected by individual health status (Veira-Ramos, 1998). Similarly, there is some evidence suggesting that human capital characteristics explain partial reversals so that highly skilled professionals and highly educated individuals in general are less prone to retire completely (Veira-Ramos, 1998), and evidence of a positive relation between levels of education and labor force participation exists in all countries of the region.

These relations suggest that labor force participation rates among the elderly are a complex function of labor markets and human capital conditions, as well as of individual health status and alternative sources of support, including formal sources such as pension systems and informal sources such as family and kin. Aggregate trends by countries such as those in Tables 11a and 11b confound changes in all these factors and make it difficult to draw inferences about individual decision making. Consequently, even if we had perfect foresight regarding future directions of pension reform in the region, it would be impossible to infer labor force participation rates with any degree of certainty. It is true that continued erosion of public pension systems and of traditional family support networks will provide individuals with a strong incentive to remain in or reenter the labor force. This simply means that there will be forces increasing the demand for work among the elderly. But other forces, such as deterioration of health conditions to which we referred above, may act in the opposite direction, reducing the demand for work. Similarly, the conditions for higher supply of labor may never materialize since the introduction of new technologies and reforms in production and distribution techniques may require a blend of skills that is not available among elderly cohorts, and unlikely to be generated at low cost in the short run. We suspect that constraints of these sorts, affecting the supply and demand side of labor force participation, are more likely to affect elderly of lower socioeconomic status whose health is more likely to be impaired and whose human capital is less

likely to meet labor market conditions. And yet, this same sub-population is less likely to be favored by the accessibility to and availability of pension funds and associated benefits. A similar argument can be made regarding elderly female labor force participation: not only do females appear to experience lower health status than males, but those who will become part of the population 60 and over between the years 2000 and 2025 belong to cohorts whose educational levels, technical training, and labor market experience gives them reduced chances in open competition for available jobs. In both cases, for the elderly population of lower social strata and for elderly females, an important uncertainty is the supply of support from families and kin networks. This is reviewed in the next section.

D. Family and kin networks

D.1. Transfer mechanisms

In theory, consumption and production over the life cycle of individuals must balance out. There are three mechanisms through which the balance can be effected (Ryder, 1988). The first involves only individuals themselves who save (accumulate assets) during their most productive years to consume during old age when they are economically less productive. If productive years are not enough to support consumption transfers to old age, the deficit must be made up by either reducing consumption (and thus affecting well-being) or by increasing production at older ages (increasing labor force participation). The second mechanism involves transfers from one generation (younger) to another (older or very young) via family relations. This mechanism involves one mediating institution, the family (or kin group or clan), that secures a correspondence between individuals as consumers and their claim to goods and services produced by other members of the family. The third mechanism consists of transfers from one generation to another via state-mediated institutions, primarily through taxation and other income redistribution instruments. These transfers are regulated by explicit laws and enforced by state agencies.

An important contrast between these mechanisms is that whereas those involving personal savings and inter-cohort resource transfers involve solely material goods and services, that is, purely economic resources, the ones associated with intra family transfers can and frequently do include emotional and moral support, personal company, and other non-tangible goods.

Economic support of the elderly in any society must be achieved through a combination of these three mechanisms, and any one country will be characterized by the mechanism that is dominant at any one time. Developed societies are characterized by systems where a combination of the first and third mechanisms prevails. Traditional societies, such as those in Asia and Latin America before World War II, are dominated by the second mechanism, with the first and third operating for reduced segments of the population only. But this profile is in flux and is likely to change drastically in the near future.

In this section we examine intra-family transfers and their prevalence in countries of the region. Section E deals with the status of personal and socially mediated transfers.

D.2. Intra-family transfers

In some pre-industrial societies and in most developing countries, support of the elderly is largely achieved via exchanges involving the elderly and family members and kin (Hermalin et al., 1992a, 1992b; DeVos, 1990; Palloni and DeVos, 1994). Indeed, it has been argued that a strong determinant of high fertility levels in more traditional societies is the so-called **old-age security motive** according to which fertility targets are maintained at high levels in order to ensure that older members of a family or group are supported by younger members, when they are no longer able to work or to perform activities in the interest of the family or kin group. Although the ranking of this factor relative to other determinants of high fertility is unclear, it is believed by some to have non-trivial influences (Caldwell, 1982).

As a rule intra-family exchanges include goods and services, favors and gifts, emotional and psychological support and, invariably, some form of residential arrangement whereby older people share living quarters with members of younger generations. Whether or not these exchanges are realized and observed at any one time depends on two factors. The first are familial preferences that dictate the elderly's demand for and desirability of the exchanges. The second is the availability of family members and their ability and willingness to be a part of the exchange.

In what follows we document patterns of elderly residential arrangements in the region since they are the only ones for which we have relatively extensive empirical evidence for more than one point in time from censuses and surveys. One way to assess living arrangements with census and survey data is to identify first the composition by marital status and then the distribution of the elderly by household extension type at several points in time. The view

provided by such information is pseudo-dynamic since it does not succeed in reproducing the conditions affecting the elderly life course. Unless we have access to multiple, repeated cross-sections, we will not be able to identify from the data effects of age and of cohort membership and, therefore, we will not be able to evaluate the nature of changes in patterns of union formation and of residential arrangements. In what follows we begin with an examination of elderly marital status composition, and then examine their patterns of co-residence.

D.2. 1. Composition by marital status

Marital patterns of the elderly are a key feature of family life since the conjugal union is central to family structure. They determine intergenerational relations, inheritance and residence patterns, expectations of responsibility and rights, independence, interdependence and gender roles. They are the key factors determining whether a family is extended or simple. Indeed, they are the foundation of all residential arrangements involving the elderly.

It may be tempting to liken marital status composition and patterns prevailing among elderly people in Latin America and the Caribbean today to that which occurred in North America before Social Security was established. But the region has paradoxical family structure(s) in large part because its marriage regime is a curious mixture of European patterns and those associated with indigenous peoples, slaves, and the type of colonization regime experienced. Central to the problem has been the evaluation of the widespread practice of maintaining informal unions by both formally married and single people. And while breakup of a consensual union (even those lasting for many years) is sometimes considered separation, not uncommonly it simply means reverting back to the never married state. Except for the prestige and social acceptance attached to formal marriage, it is not clear why type of union should matter at all because it is very difficult to separate marriage type from economic circumstances to establish causality of any kind. The distinction may become more important in the future, however, if social security and benefits depend on the legal status of a union and its offspring.

It appears increasingly acceptable to report one's marital status as actually being in a consensual union and the status has finally been acknowledged by most censuses as a *bona fide* one. This enabled Palloni and De Vos (1994) to use fairly recently reported information to group Latin American countries into three classes according to the extent to which adult women who

were in a union were in a consensual union. Most countries reported that to be a fourth or more.[10] Being in a reported consensual union is less common among older people than among younger people, but even using figures on marital distributions of the population 60 and over reported in a fairly recent U.N. Demographic Yearbook (reproduced in Table 12), one can see that among males older than 60 about a fifth or more were reported to be in a consensual union in Cuba, Guatemala, Panama and Venezuela. Reporting never marriage instead of being in a consensual union, divorced or separated, may still be more common than one might suspect at first glance, however, especially among elderly people. In Colombia, for example, there is a large disparity between men and women when each category is considered separately, but a fairly similar quantity if one adds the proportions in the different categories (single, consensual unions).[11] If some of the women who were reported as never married were actually in a consensual union, the disparity would be much more credible.

[Table 12 about here]

But, as was noted in a previous section, the biggest gender difference by far is that related to being married or widowed. A majority of elderly men tend still to be married while this is much less likely for women. In fact, as a rule somewhere around 15 percent of the men and 40 percent or more among the women tend to be widowed. Although not shown in the table, the age patterns of widowhood prevalence rise steeply for both males and females but at higher ages the gender differential is naturally attenuated. It is not clear what will be the future of the gender gaps in widowhood. As mortality at older ages declines further it is likely that it will tend to be attenuated unless, of course, improvements in survival are disproportionately allocated among females.

Thus, residential arrangements of the elderly have as basic material a population disproportionately composed of unmarried women or women not in a partnership. This imbalance increases with age and is likely to be maintained in the near future.

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[10] Those countries included Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Panama and Venezuela. Countries **not** in that category included Costa Rica, Paraguay, Peru, Argentina, Brazil, Chile, and Uruguay (Palloni and De Vos, 1994).

[11] For instance, roughly 8 percent of all males in Colombia were supposedly never married while 10 percent were in a consensual union and 4 percent were divorced/separated, a sum of 22 percent. In contrast, roughly 13 percent of

D.2. 2. Household arrangements of the elderly: what do they reflect?

Just as marital status composition of the elderly is a joint function of demographic determinants (mortality) and of culturally bounded choices (age patterns of first marriage, divorce and remarriage), so residential arrangements of the elderly are a joint function of demographic constraints determining kin availability and of culturally bounded residential preferences. Thus, observed trends of co-residence patterns are not unequivocal indicators of a change of preference or of demographic regimes.

A fairly typical scenario is one where extension of household living arrangements including the elderly cease to be prevalent not because of erosion in preferences but because changes in demographic regimes impose severe constraints on the availability (supply) of kin. Thus, for example, although Korean families have traditionally expressed a strong preferences for household extension, the proportion of horizontally and vertically extended households falls sharply after the drop of post-World War II fertility decline. Furthermore, as the number of surviving male children decreases, so does the fraction of parents living in joint arrangements with their children (Lee and Palloni, 1992; Martin, 1988; 1989; Martin and Cutler, 1983). It may be thought that this outcome is only possible under the influence of changes in preferences, independently of demographic changes. As we indicate later, this is not so. A decline in the fraction of parents living with a son can occur as a result of the pressure generated by fertility decline. Thus, it is not altogether correct to infer changes in preferences from the observed realization of household types.

We know, however, that when high levels of mortality prevail, vertical extension of households is less likely and that, ceteris paribus, an improvement in survival will increase both horizontal and vertical extension. By the same token, when fertility declines as sharply as it did in Asia and more recently in Latin America, the prevalence of vertical and horizontal extension should decline. These patterns have been observed in Asia and, as we show later, they are part and parcel of the evolution of residential arrangements in Latin America as well.

One may argue that what matters for our purposes should be straightforward measures such as the fraction of elderly people who live in joint household arrangements with other kin, mostly children. These quantities are relatively insensitive to changes in mortality and fertility

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the females were never married, 3 percent were in a consensual union and 5 percent were divorced/separated for a sum of 21 percent. The situation in Venezuela is similar although the sums are greater.

since their value only depends on there being at least one surviving son (daughter) and multiple patterns of fertility and mortality can yield such result. Accordingly, an observed increase in the fraction of elderly living alone, as in Korea (Lee and Palloni, 1992; DeVos and Lee, 1988; Martin, 1988) or Taiwan (Weinstein et al., 1989), can be correctly interpreted as a result of changes of residential preferences among elderly or their children. If so, the rapid increase in the fraction of elderly living alone in countries in Asia, and perhaps in Latin America, should be an outcome of changes in preferences dictated by equally sharp changes in cultural patterns, perhaps the same that generated the precipitous decline in fertility (Martin, 1988; Martin and Kinsella, 1994). But to the extent that joint residence of the elderly and their children is the outcome of bargaining between various children and their parents, a reduction in fertility and its effects on the availability of surviving children will alter the terms of bargaining and make, for example, joint co-residence less viable. Indeed, joint co-residence with an adult child is normally subsidized by other siblings, namely, those with whom the elderly parents do no co-reside. If so, the unavailability of a large number of siblings will impose serious constraints on the realization of joint co-residence. This shows that demographic changes can by themselves alter preferences and thereby indirectly influence the prevalence of living arrangements. It is therefore erroneous to suggest that indicators of solitary living, such as the fraction of elderly living alone, can only reflect changes in preferences. They may, but in doing so they also reflect the effects of demographic changes.

D.2.3. Household arrangements of the elderly: what do we observe in the region?

To examine patterns and trends of residential arrangements of the elderly in the region we have used several sources of information to construct Tables 13a and 13b. Because of the diversity of sources we have not always adhered to our definition of elderly as those aged 60 and above but the figures in the table are sufficiently consistent to support a number of inferences. Table 13b displays the fraction of elderly population older than 60 who lives alone. Three features of this table are worth noting. First, with the exception of countries in the Caribbean, all estimates are fairly low. In developed countries the fraction of elderly people living alone always exceeds 20 percent.

Second, the rate of solitary living among females is higher than for males, particularly among females not living in a union. This indicates that higher prevalence of solitary living among females is not just a result of the fact that they are more likely to be widows but also of a

higher propensity to live alone. Finally, in all countries there is an unmistakable trend towards an increase in the rate of solitary living among males and females. And this can only be due to either changes in preferences or in kin availability.

It is interesting to note that there is no clear relation (except at the extremes) between progression of the aging process and levels of solitary living. For example, Dominican Republic, a country early in the transition toward aging, has a profile close to that of Cuba, whereas Panama has higher values than Chile and Costa Rica, countries whose aging process is fairly advanced. Although there are many factors affecting these quantities, it remains, however, a possibility that as these countries experience more rapid aging, they will follow the steps anticipated by Uruguay and move toward a much higher fraction of elderly living alone.

Table 13a displays the observed distribution of household by type, where the types or categories are associated with the Hammel/Laslett typology.[12] The residence situation of elderly people in Latin America is intermediate between that in Asia and the United States because while many elderly live in extended households (thus resembling Asia), a sizable proportion also live independently, especially if they are married (De Vos and Holden, 1988). First, the propensity to live in complex households (with some type of extension) among married elderly is higher in countries with low levels of aging and higher in those where the aging process is more advanced (contrast the figures in the next to last and last columns of the table for the category 'married'. Second, among those who are not married the propensity to live in complex arrangements is much higher than among the married and, here again, they tend to attain higher values where the aging process is in its early stages. Third, and finally, the fractions living in solitary living arrangements reproduce, as they should, the results displayed in Table 13b. Most people in Latin America, including elderly people, live with other people, but solitary living is more prevalent among unmarried elderly people than might be expected. Modest compared to the situation in places like the United States, we still observe that 10-20 percent of the unmarried elderly lived alone. Solitaires are primarily women, as women are much more likely to survive their husbands than vice versa. We know very little about them, in particular, whether they are primarily childless, prefer living alone, tend to have more or less education, live in rural or urban

[12] The U.N. recommended scheme (e.g. U.N., 1980) is concerned with the composition of a household but may obfuscate the family nature of that household because its short form considers separately a household containing a member unrelated to the household head (such as a servant or lodger) irrespective of whether the family core is

areas, or tend to be better off than counterparts who join other households.[13] Or maybe their living arrangements have more to do with the situation of their children/other kin than themselves.

[Table 13a about here]

[Table 13b about here]

Overall, we find that roughly half to two-thirds of elderly people aged 60 and over lived with extended family, but this is only a third to one-half among married people and two-thirds to three-quarters among unmarried elders. Equivalently, roughly half of married elders aged 60 and over lived in simple family or nuclear households compared to about 10 percent of unmarried elders. Although they are both classified as simple, the type of 'simple' household containing an unmarried elder is very different from the 'simple' household that contains a married couple. While there were some cases in which the elderly person in a simple family household was actually the never-married child of an even older parent, most simple households lived in by an unmarried elder are households in which there are dependent children too young to have left home yet. This is especially the case when some women continued childbearing into their 40s and even 50s. In contrast, many of the simple households lived in by married elders are empty nests, households in which the couple is a family but the children, if any, no longer live there.

Although Table 13b does reveal an association between the fraction of elderly living alone and in solitary households and the degree of the country's aging, the relation is weak. Furthermore, it is unclear whether the association is the result of demographic constraints or of shifting preferences. In any case the linkage is of great policy-relevance because living alone might be a marker for particular vulnerability to many problems.

How have living arrangements in the region changed over time? In a exhaustive examination of the 1960 and 1980 Brazilean censuses, Agree (1993) uncovers a dramatic increase in the fraction of elderly living alone. Among men aged 55 and over the proportion living alone increases from 3.8 percent to 5.5 percent, whereas the fraction of all females living along increases from 5.1 percent to 8.8 percent. The trend is even sharper in the unmarried

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nuclear or extended. The Hammel/Laslett (1974) scheme (short form) ignores the presence of unrelated individuals unless there is no family core (in which case the household is categorized as 'no family'.)

[13] See the work on aging and the family by Ramoz on Brazil (Ramoz, 1994).

population. Thus, the proportion living alone among unmarried males aged 55 and over increases from 18 percent to 29 percent, whereas among females the increase is from 8.8 percent to 16.4 percent. The bulk of the increase can be attributable to a decrease in the fraction of elderly people living in three-generation families. The case of Brazil is telling since by 1980 the bulk of fertility decline had not yet taken place whereas the mortality decline had already made its major impact. This means that one cannot attribute the observed changes to demographic constraints, and that there must be in place either new non-demographic constraints (housing, for example) or a shift in preferences.

Although a trend towards reduced joint living arrangements among the elderly is of concern, particularly if occurring simultaneously with a deterioration of the other mechanisms that facilitate transfers of wealth over the life cycle, it is important not to exaggerate its influence. As suggested in other research, joint co-residence may turn out to be an undesirable arrangement for the elderly and younger people alike as it curtails their independence (Martin and Kinsella, 1994), or it could be a marker for ill-health, disability, and poverty (Ramos, 1994). Finally, it should remembered that absence of co-residence does not in itself indicate an absolute lack of exchange of material goods and services or intangibles, such as emotional support and care, between elderly and kin living nearby but not in the same household.

E. Intercohort transfers and pension systems

E.1. Intercohort transfers

As stated before, over the life cycle of an individual the discounted age patterns of consumption and the present value of savings must balance out. However, at a given point in time, aggregate levels of expenditures (benefits) and aggregate levels of receipts (taxes) may not balance. Benefits for the elderly are all payments for consumption of goods and services. The bulk among the latter take the form of health related expenditures. In the absence of intra-family transfers, these payments are financed by either public pension and welfare funds or by private and semi-private capitalization funds. Solvency of the aggregate system is a fragile condition that depends on a number of factors: demographics (age structure of the population), taxation and savings levels, age patterns of labor force participation, and the demand for services induced by the health status of the elderly population.

To facilitate discussion we rely on the graphic illustration introduced by Lee and Tuljapurkar (1997). Figure 9 is a schematic version of their graphic representing the age patterns

of consumption and of labor earnings estimated for the US for 1987-1988. The consumption curve shows a gradual increase with age and then a decrease at very old ages. The curve of labor earnings has a bell-shaped pattern with a maximum attained at the peak of active life. The third curve in the graph displays the values of net earnings, or the difference between consumption and earnings. If the transfer system prevailing in a society is solely dependent on the individual (private capitalization regimes), the area under the curve of net earnings (when appropriately discounted) must add up to zero.

When the transference system is dependent on the inter-cohort mechanism, what matters is the equality between taxes paid by cohorts (age patterns of taxes) in the labor force and benefits received (age pattern of benefits), that is, the age pattern of net taxes. The estimated age pattern of net taxes for the US in 1994 is displayed in Figure 10 . This is a stylized version of Lee and Tuljapurkar's graphic representation of estimated age patterns of benefits and taxes (Lee and Tuljapurkar, 1997). Again, under equilibrium the area under the net benefit curve must add up to zero indicating that benefits and taxes balance each other out.

Finally, in a system totally dependent on intra-family transfers a curve of net benefits similar to those displayed in Figures 9 and 10 will apply. When, as is more likely in empirical cases, a combination of transfer mechanisms is operating, what matters is the balance across all three systems.

Countries of the region have been largely dominated by systems associated with inter-cohort transfers or the so-called 'pay-as-you-go' schemes which have prevailed in combination with the intra-family mechanism. Since the late seventies a trend toward replacement of the pay-as-you-go scheme with one based on private capitalization began to develop and many countries have already embraced or will soon embrace such a scheme. One of the reasons for the shift is rooted in the persistent lack of solvency of the older system that has led in many cases to large inflationary fiscal deficits. Since the demographic profile of a number of these countries is toward an older age distribution, the weaknesses of the pay-as-you-go system are likely to be exacerbated as time goes by.

In addition private capitalization schemes are a key element of structural adjustment programs that seek to downsize the public sector and to liberalize labor and capital markets. These schemes are expected to provide an important source of savings and capital accumulation, and should be strategic in energizing the economies of the countries that adopt them. Thus, a

transition towards a private capitalization system appears attractive. However, for reasons explored below, such transformations and reforms are unlikely to solve the crisis that will be created by the rapid growth of the elderly population at least between the years 2000 and 2035. To identify the ingredients of the problem we will first review general features of the existing social security and pension systems in countries of the region. We will then examine the difficulties that the demographic growth of the elderly and their distribution by health and disability status is likely to generate.

[Figure 9 about here]

[Figure 10 about here]

E.2. Pension systems in the region: conditions at the time of reforms

In most countries of the region pension payments are just one component of general social security expenses as the latter also include health payments to population of all ages. The age distribution of pension payments increases with age from a flat level near zero before age 50 or so to a maximum after ages 60 or 65 (See Figures 9 and 10). Although we do not have information to confirm this, the age pattern of health payments must also increase with age, reflecting higher demand for health care services and corresponding health expenditures at older ages (Over et al., 1992; Murray et al., 1992).[14] Thus, while the discussion below only focuses on pension costs, it is important to remember that health expenditures are a significant part of the total cost load of the elderly.

We begin with an examination of Table 14. This is a modified version of a very useful table elaborated by Mesa-Lago (1985). This table groups countries of the region (excluding Barbados, Jamaica and Trinidad) according to several dimensions of the social security system. These dimensions are represented by each of the columns. The first column is an estimate of the year in which the system was put in place. It should be noted that some countries have had social security systems operating for a longer time than in the US (see also Malloy, 1985). The second column is the proportion of the population covered by the health component of social security and the third is the proportion of the economically active population covered by the pension

[14] The age pattern of total health expenditures includes three components: those allocated as part of social security, those associated with the public health sector, and private expenditures.

program. The fourth column is the cost of social security as a fraction of the Domestic Gross Product, whereas the fifth column displays the cost of pensions as a fraction of the total cost of social security. The last column in the table is the fraction of the population receiving pensions to the populations contributing to the fund.

The main message of this table is a dismal one. Note that countries listed first in the table are those whose social security system has more coverage, is most onerous, represents a larger fraction of the Domestic Gross Product, and where the ratio of beneficiaries to contributors are the highest. These are the same countries whose past demographic trends are forcing a more rapid momentum toward aging and, therefore, where the stress generated by a demand for elderly benefits will increase more rapidly. The situation would look even more dismal had we considered elderly health care costs in addition to pension costs.

But this table only reveals to us difficulties in generating a balanced aggregate accounting. Indeed, absent from the table is the deterioration of the real value of payments to pensioners and the decline in the quality and coverage of health care services provide to them. Both of these are a result of the economic crises experienced by most of these countries during the decade of the eighties, and the crunching belt-tightening that inevitably accompanies fiscal policies designed as solutions (Hoskins, 1991; McGreevey, 1990).

The disparity between males and females is another absent characteristic in the table. Only in a few countries (Argentina, Uruguay) are females covered by pension funds other than those associated with survivors benefits from a deceased husband. In most countries of the region, females are minimally covered.

E.3. Pension systems in the region: nature of the reform

The pay-as-you-go system is in crisis. In response to this crisis since the mid seventies there has been a growing trend to replace partially or completely the old system with a private capitalization scheme whereby workers (with contributions from employers) save during the productive years to pay for their own benefits at older ages. These schemes are usually accompanied by but are independent of contributions toward disability and health care. In a very recent and insightful analysis of pension reform in Latin America, Barrientos (1997) reviews the main features of the reform. These are summarized in Table 15 for countries with available data. This table is a summary of the country-by-country information assembled by Barrientos (1997). The most important feature of this table is the regional breadth of the reform: this is truly an

example of a diffusion process where a few forerunners (in this case, Chile) led the way in a process that snowballs rapidly. The second characteristic in the table is the relative diversity of schemes, particularly when one examines the co-existence (or not) of a unitary versus a dual choice system. This is likely to remain as countries accommodate to the painful adjustments during the transition from one system to the other. The third feature has to do with the universal presence of a minimum pension plan component designed as a safety net for the most vulnerable in the work force. Finally, it is worth noting that, with the exception of Peru, countries who are early adopters of private pension plans are those where the speed of population aging is highest.

E.4. Demographic growth, health and disability and the balance of pension systems

In a pay-as-you-go system, there are several sources of tension that need to be neutralized. The first is associated with the sheer increase in the older population relative to the economically active population. As we showed before all countries in the region will surely experience a drastic increase in the ratio of pensioners to workers as a result of past demographic trends. Thus, the figures in the last column of Table 14 will only get worse as time goes by, and there is nothing that can be done to attenuate the problem.

The second source of tension is associated with improvements of survival of the elderly population. Gains in survival will increase the expected length of time to be spent as a pensioner, and will be manifested numerically in an increase in the rate of increase of the elderly population and as an increase in the proportion of the total population aged 60 and above. Unlike the previous source of tension, this one will depend on future rather than on past trends in mortality.

The third source of tension is related to the health status of the elderly. Demand for health care services will certainly go up simply as a result of the increase in the population 60 and above. But the rate at which the demand will increase may be variable. This is because the total size of the demand for health care can be expressed as:

$$H= (d1*(1-f)+d2*f)*P$$

where H is the total demand for health care services, d1 and d2 are the per year demand for a healthy and unhealthy elderly respectively, f is the fraction of unhealthy elderly and P is the total elderly population. The rate of increase of H, r_h, is the sum of two components: the rate of increase in the population 60 and above, r(60+), and the product of the rate of increase of the

fraction of healthy elderly, r_h, and a quantity, q, strictly less than 1 that depends on the difference between the average per person-year value of the demand for health care services for an unhealthy and a healthy individual,

$$r_h = q^* r_f + r(60+)$$

In previous sections we showed that r(60+) will inevitably attain higher values, and provided an argumentation suggesting that the quantity r_f is likely to be headed upwards. Thus, in the absence of changes in health care costs the most likely occurrence is that r_h will be more than proportional to the rate of increase of the elderly population. Under the best of conditions (when the unit costs for the healthy and unhealthy are the same), r_h will be identical to r(60+). In either case, failure of r_h to keep pace with r(60+) or a higher quantity will mean drastic deterioration in quality of living of the elderly.

The imbalance generated by excess demand for pension payments and health care services generated by these three sources of tension will require measures with adverse effects on one or more sub-populations. First, benefits to the elderly can be reduced. This can take the form of reductions in the real value of pension payments or in the real value of health benefits. Obviously this will occur only at the expense of elderly standard of living and quality of life. Second, age at retirement can be gradually increased so that pension expenditures (and associated health benefits) balance out tax receipts. Third, tax receipts to the economically active population can be increased. In most cases a combination of these solutions produces temporary relief in a relatively equitable manner.

Can privatization schemes overcome these sources of tension?

A tentative answer to this question has two parts. The first part is negative: privatization schemes will not solve the problem that will be created in the next twenty to thirty years due to the increase in the demand for pensions and health care services of the growing elderly population. This is simply because implementation of the privatization scheme requires a transition period which will coincide with the period of most rapid growth of the elderly population. Suppose that privatization schemes are fully implemented by 2000. A large majority of the population aged 60 and above at that time will have spent most of their economically active life under the old system, and will require some type of inter-cohort transfers. To the

extent that contributions by tax-paying individuals will be reduced to make room for private capitalization, the overall amount of benefits to be allocated will need to contract unless new taxes are put in place, benefits are cut, retirement age increased or, equivalently, productivity increases more than expected.

The second part is a qualified maybe. Note that the previous equality between rates of increase holds for populations belonging to different social strata. In addition to the assumptions about rates of return and containment of administrative costs, privatization schemes assume an economically active population productive enough to generate incomes leaving room for accumulation of assets during the life cycle. The most important question is: what is the economically active population that satisfies this latter assumption? If a large fraction of the economically active population is in production activities where productivity is substandard, either the quality of living of the elderly will deteriorate or there will have to be in place redistributive mechanisms to satisfy demands where privatization is simply not viable. Privatization schemes could, in the long run, solve the impasse created by demographic imbalances only if founded on economies where the economically active population previously marginalized and confined to relatively traditional and unproductive activities is fully incorporated into the modern sector. All private pension plans being contemplated in the region have a minimum pension component that is designed to attenuate the consequences of the inequalities referred to before. As recognized by Barrientos, “Given the extent of low pay and irregular employment in Latin American countries, minimum pensions are likely to be an important source of income in old age, and will become in practice a first tier of pension provision in the future” (Barrientos, 1997: 345). But since this feature of last resort (‘safety net’) requires long periods of contributions to qualify, it is unlikely that it will be ideal to protect those who are most vulnerable in the labor force. In some countries the privatization scheme includes redistributive features via solidarity fees to subsidize the pension payments of the least lucky among workers (Barrientos, 1997).

But even under ideal conditions there are important caveats. The assumption is always made that accumulated assets during the economically active life of an individual are associated with rates of return and minimally beneficial annuity markets to cover expenses incurred after abandoning the labor force. As simulation studies conducted by several economists reveal (Barrientos and Firinguetti, 1995; Margozzini, 1988) this assumption is a key ingredient that

determines the health of the pension scheme. Indeed, these studies reveal that the replacement rate (the ratio of pension annuity benefits to final salary) is highly dependent on the rate of return, more so than on the rate of growth of salary. Since the rate of return is a function of general macroeconomic conditions, the robustness of annuity markets, administrative costs and funds' investment strategies, it is clear that the assumption is not only fundamental but also fairly fragile. Similarly, these simulations show that lack of continuity in labor market participation causes the replacement rate to plummet. Since uninterrupted labor market careers are likely to be the province of a few, the new pension scheme could generate insufficient benefits and huge inequalities.

The problem is complicated even more when there are gradual gains in survival at older ages or when the fraction of an extra year of life expected to be lived disabled or in ill-health increases. Admittedly, adjustments to the corresponding expected increases in expenditures can be made along the way, as individuals are contributing, but they will require that contributors be able and willing to increase the fraction of foregone consumption during their economically active life. From this derives the importance that calculations be made explicitly taking into account the expected gains in survival and expected health conditions of those who will retire in the near future.

In sum, the new schemes are unlikely to solve the problems posed by the demographic profile of the elderly. As Barrientos concludes: "Pension reform has contributed to make the labour market the main source of social insurance for the majority of households in Latin America. Given the record of the Latin American economies in the past few decades, and the current changes under way in their labour markets, it is at least doubtful that the growing ranks of the old will find the future more secure" (Barrientos, 1997: 351).

What are feasible alternatives? It is telling in this respect to note that while the elderly population covered by a number of pension plans in Asian countries has gradually increased over time, increasingly weary governments are warning that it will be necessary to reinforce family and kin sources of support. The mounting financial pressure exerted by the growth of the elderly population appears impossible to arrest or attenuate with conventional instruments involving fiscal and private expenditures. It is unlikely that countries in the region will have a different alternative to which they can resort.

F. Urgent policy issues: health expenditures, social security and quality of life

We evaluated a number of dimensions of the aging process in the region. In a number of places the review identified important roadblocks, areas that could benefit from well-designed policies. What are then the most relevant policy issues identified by the foregoing discussion? In truth, each dimension of aging is a locus of problems and difficulties that demand specially tailored interventions. However, the most important and pressing are those that require us to understand, influence and manipulate factors linking a number of dimensions simultaneously. In what follows we identify the most important in the form of summary bullets.

Future aging in the region's population has a momentum of its own

The demographic momentum of aging in the region is rooted in the history of demographic growth experienced for the past 50 years or so. The rate of increase of the elderly population will remain high or increase and so will the mean and median ages of the population. This is mainly a result of the sharp mortality decline that most countries in the region underwent after 1940. The fraction represented by the elderly population could increase or decrease, depending on future trends in fertility. The most likely scenario is that this quantity too will undergo an upward surge as fertility levels plummet toward low levels in an irreversible process. Neither of these driving forces can be manipulated since they are the result of past history or of large macro process, unlikely to be easily malleable. It is on their consequences that one should concentrate policy making efforts.

Socioeconomic differentials

Although it is difficult to determine with precision the magnitude of differentials in the age structure across social classes or strata, it is certainly the case that when measured by levels of education, the distribution of elderly is biased toward those of lower strata. To some extent this is a cohort phenomenon in the sense that those who are now elderly or will soon become part of the elderly population were exposed to more constrained conditions of social ascension when young. The net result is that the elderly population in the region will be composed of an unprecedentedly large fraction of people with low levels of education, more likely to have been in economic sectors with substandard productivity, more devoid of accumulated assets and resources, and with less access to services to mitigate crises of old age.

Rural-urban differentials

Due to demographic forces in place during the post-1950 years, urban and rural areas have experienced aging. Although it is difficult to assert with confidence, urban and rural areas are probably aging at similar rates but the forces leading to this result are not the same in each place. However, the proportionate distribution of the elderly by area of residence includes relatively large fractions of rural elderly. This is a unique characteristic of the aging process in the region. Unlike the experience of developed countries, countries in the region will need to target the rural elderly who, due to conditions associated with health status and disability, access to health services, and labor market participation, are likely to fare worse than the urban elderly.

One of the causes of population aging may affect the health status composition of the elderly

To the extent that early life conditions influence later life health and disability, we should expect important changes in the distribution of the elderly population by disability and health status. Improvements in survival during early life associated with medical innovations which are not accompanied by proportionate changes in standards of living may have altered the average propensity to experience later life conditions. The most likely scenario is one where health and disability status deteriorates progressively as the cohorts who experience the brunt of mortality decline approach older ages. Since this process has different effects based on social strata and rural-urban residence, we also expect that social or strata differentials in health status among the elderly will increase as aging progresses.

This calls for careful evaluation and monitoring of the progression of elderly health status and disability, as they will exert disproportionate influence on demands for health care services.

Gender differentials

At older ages half or more of the population is composed of females, the majority of whom do not live in a partnership. The inequality in survival that favors females dictates that this be so. And, to the extent that females are less likely to have participated in the labor force when younger, their access to assets, income, and benefit payments of various sorts is severely reduced. This is worsened by restrictions in the component of pension programs related to survivors' benefits. As a result, elderly populations in the region contain a sizeable component of women living near or below the poverty line. This disparity is offset somewhat by their higher propensity to live with children or relatives.

For these reasons elderly females ought to be targeted as a sub-population with special needs and demands.

The dissolution of traditional residential arrangements

As an outcome of a combination of forces, some affecting kin availability via demographic constraints, others affecting the system of residential preferences, joint residence of elderly and other kin, particularly adult children, has been reduced and the fraction of elderly living alone has increased. This trend is part and parcel of the aging process in other countries such as Taiwan and Korea.

It is not altogether clear, however, to what extent this trend will affect elderly well being. If joint co-residence is part of an exchange that provides material goods (housing costs, food sharing etc.) or emotional and psychological support (company, care and attention), then the trend will surely have negative consequences, all the more so in the presence of collapsing pension systems and other social security benefits. If, instead, joint co-residence is a safety net, a mechanism of last resort designed to support the disabled, or the very ill, or the very poor, then the demise of joint co-residence will have more selective effects, e.g., only on those that are targeted by it.

Pressures on transfer systems and the crisis of social support

Any transfer system that is put in place now will be exposed to the pressures of a growing elderly population, increases in survival at older ages, and future changes in the composition by disability and health status. The intra-family transfer system could continue to operate to some extent either via residential arrangements or through actual exchange of goods and services. But its reach is limited and it will surely be insufficient to absorb the increase in cost loads expected in the near future. The inter-cohort mechanism is bankrupt in many countries, and if not now, it will be bankrupt in the near future. This system is not viable without undesirable adverse effects on the elderly, younger cohorts of workers or both. Finally, the private capitalization mechanism is very new, carries considerable transitional costs precisely during the period when the largest growth of the elderly will occur, and even in the long run its success is not guaranteed for it is designed to serve a population that participates continuously in the labor force and in sectors where productivity is relatively high. It simply leaves out (except for patches and ad hoc amendments) the needs of the marginal worker, those that constitute, at least until now, the majority of the labor force in countries of the region.

Demand for health care and the provision of health care services

The health component of the social security system is subject to the same qualifications described above. We know that the current system financed on a pay-as-you-go basis or via public health expenditures from general revenues is insufficient, inefficient, and inadequate. To attend to the demands of a growing elderly population, one that may be more predisposed to be ill and disabled than previous cohorts, it will not suffice to shift in toto to a system based on private capitalization. A key ingredient will be the ability of policy makers to blend the beneficial characteristics of both systems and to mitigate their adverse consequences.

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Table 1: Values of C(t), R(t), A(t) and M(t) for 1950 - 2025

	1950				1990				2025			
	C(t)	R(t)	M(t)	A(t)	C(t)	R(t)	M(t)	A(t)	C(t)	R(t)	M(t)	A(t)
Argentina	7.0	.11	25.7	25.5	12.9	.23	27.2	31.2	16.6	.27	33.6	34.8
Boliva	5.6	.11	19.2	24.2	5.8	.11	19.0	24.4	8.9	.14	26.3	27.4
Brazil	4.9	.09	19.2	23.5	6.7	.12	22.7	25.2	15.3	.25	34.4	33.5
Chile	6.9	.12	22.2	25.4	9.0	.15	25.6	27.5	18.2	.31	34.3	36.3
Colombia	5.6	.11	18.7	24.2	6.2	.11	22.0	24.7	9.7	.23	32.0	28.1
Costa Rica	5.7	.11	18.3	24.3	6.4	.11	22.2	24.9	14.3	.22	30.8	32.6
Cuba	7.3	.13	23.3	25.8	11.7	.18	27.8	30.1	25.0	.30	43.3	42.9
Dominican Republic	5.2	.10	17.7	23.8	5.6	.09	21.0	24.2	14.2	.23	32.5	32.5
Ecuador	8.1	.16	20.6	26.6	6.1	.11	20.1	24.6	12.6	.20	31.4	30.9
El Salvador	4.8	.09	18.3	23.4	6.0	.12	18.4	24.6	10.1	.16	29.9	28.5
Guatemala	4.3	.08	17.7	22.9	5.1	.10	17.1	23.7	7.4	.12	23.9	25.9
Honduras	3.9	.08	17.2	22.5	4.5	.09	17.2	23.1	8.6	.14	26.7	27.1
Mexico	7.1	.14	19.1	25.6	5.9	.11	19.7	24.5	13.5	.21	32.5	31.8
Nicaragua	4.1	.08	17.6	22.7	4.3	.09	16.7	22.9	8.4	.13	27.0	26.9
Panama	6.5	.12	20.2	25.0	7.3	.14	22.0	25.8	10.5	.25	33.7	28.9
Paraguay	8.9	.17	20.9	27.4	5.4	.10	19.0	24.0	9.4	.16	25.8	27.8
Peru	5.7	.11	19.1	24.3	6.1	.11	20.4	24.7	12.6	.20	31.7	30.9
Uruguay	11.8	.20	27.8	30.2	16.5	.29	30.9	34.7	18.4	.31	35.4	36.5
Venezuela	3.4	.06	18.3	22.0	5.7	.10	20.9	24.3	13.2	.21	31.0	31.5
Barbados	8.5	.15	24.6	27.0	15.3	.25	28.4	33.5	23.2	.39	40.4	41.2
Jamaica	5.8	.10	22.2	24.4	9.2	.16	22.5	27.6	14.9	.24	33.9	33.2
Trinidad	6.1	.11	20.7	24.6	8.7	.15	24.1	27.2	17.4	.28	36.3	35.6
Puerto Rico	6.1	.12	18.4	24.6	13.2	.23	28.5	31.5	20.5	.35	37.0	38.6
United States	12.5	.21	30.0	30.8	16.6	.27	32.8	34.8	24.7	.44	38.9	42.6
Japan	7.7	.24	22.3	26.2	17.4	.27	37.4	35.6	32.1	.59	47.8	49.8

Sources: Values of C(t), R(t) and M(t) from United Nations (1997). Values of A(t) from regression equations relating A(t) to several parameters of an age distribution including rate of growth, proportion below ages 1 and 5, proportion above ages 65 and 85.

Table 2: Values of r (60+, t) and r (t) for Three Periods During 1950-2025

	1950-60		1980-90		2015-25	
	r(60+,t)	r(t)	r(60+,t)	r(t)	r(60+,t)	r(t)
Argentina	.041	.018	.023	.015	.019	.008
Boliva	.019	.021	.026	.021	.034	.016
Brazil	.038	.030	.027	.019	.043	.008
Chile	.031	.022	.025	.016	.035	.009
Colombia	.020	.029	.029	.021	.044	.011
Costa Rica	.021	.036	.044	.028	.044	.013
Cuba	.026	.018	.016	.009	.027	.001
Dominican Republic	.026	.032	.038	.022	.045	.009
Ecuador	.013	.027	.029	.025	.039	.011
El Salvador	.031	.029	.041	.010	.038	.013
Guatemala	.031	.029	.041	.029	.038	.020
Honduras	.032	.032	.036	.031	.044	.016
Mexico	.026	.029	.030	.021	.039	.009
Nicaragua	.025	.031	.032	.025	.047	.016
Panama	.030	.027	.029	.021	.038	.009
Paraguay	.025	.021	.012	.030	.047	.019
Peru	.025	.026	.031	.022	.037	.011
Uruguay	.013	.013	.018	.006	.012	.004
Venezuela	.061	.040	.039	.026	.041	.012
Barbados	.025	.009	.005	.003	.036	.005
Jamaica	.028	.015	.009	.010	.050	.010
Trinidad	.025	.028	.021	.013	.038	.008
Puerto Rico	.030	.006	.026	.010	.019	.006
United States	.023	.016	.016	.010	.025	.008
Japan	.026	.012	.036	.006	.004	-.004

Source: United Nations (1997)

Table 3: Population 80+ as a fraction of Population 60+: 1995-2025

	1995	2025
Argentina	.13	.16
Brazil	.09	.11
Chile	.11	.14
Costa Rica	.12	.14
Cuba	.20	.18
Peru	.11	.15
Uruguay	.15	.21
U.S.	.12	.10

Source: Unpublished figures from U. S. Bureau of Census, 1998. Personal communication with Eduardo Arriaga.

Table 4: Ratios of Male to Female Population Ages 75+ and Gender Differentials in Mortality

	1995			2025		
	I[(1)]	II[(2)]	III[(3)]	I[(1)]	II[(2)]	III[(3)]
Argentina	.62	.89	.78	.63	.92	.80
Brazil	.64	.92	.93	.63	.95	.89
Chile	.63	.89	.82	.61	.91	.02
Costa Rica	.56	.95	.87	.58	.96	.86
Cuba	.54	.96	.90	.59	.96	.87
Peru	.58	.92	.90	.57	.95	.88
Uruguay	.62	.90	.79	.62	.91	.82

(1) Ratio of male to female population aged 75+
(2) Ratio of male to female probability of surviving to age 60
(3) Ratio of male to female life expectancy at age 60
Sources: Unpublished figures from U. S. Bureau of the Census (1998), (see source for Table 3) and life tables taken from United Nations (1997)

Table 5: Proportion of Women 60 and over Without Partners

Argentina		
	1970	.62
	1981	.63
Bolivia		
	1976	.62
Brazil		
	1970	.45
	1980	.58
Chile		
	1970	.66
	1982	.64
Colombia		
	1973	.74
	1985	.68
Costa Rica		
	1973	.63
	1984	.60
Dom. Republic		
	1970	.75
	1981	.69
Ecuador		
	1974	.62
	1982	.59
Guatemala		
	1981	.63
Mexico		
	1970	.65
	1980	.55(+)
Nicaragua		
	1971	.74
Panama		
	1970	.68
	1980	.64
Paraguay		
	1972	.69
	1982	.62
Venezuela		
	1981	.68
Cuba		
	1985	.43(++)
El Salvador		
	1985	.81(+)
Jamaica		
	1985	.69(+)
Trinidad		
	1985	.55(+)
Uruguay		
	1985	.67(*+)

Sources: Samples of decennial census
(+) PAHO country profiles
(++) Hernandez-Castellon (1994)
(*+) Arriaga and Damonte (1990)

Table 6: Percentage of Population 60+ With No Schooling

	1970-1980	1980-1990
Argentina	.16	.15
Boliva	.72	-
Brazil	.50	-
Chile	.32	.21
Colombia	.40	.32
Costa Rica	.25	.19
Dominican Republic	.58	.62
Ecuador	.50	.42
Guatemala	.62	-
Honduras	-	.64
Mexico	.57	.40
Nicaragua	.52	-
Panama	.48	.33
Paraguay	.39	.33
Peru	.57	.38
Uruguay	.04	.04
Venezuela	.53	-

Source: Pelaez and Arguello, 1983

Table 7: Aging in Urban and Rural Areas in Latin America and the Caribbean, 1980-2025

	C (t)				Proportion of Elderly Living in Urban Areas		Proportion Total Population Living in Urban Areas		Ratio of Growth
	1980		2025						
	Urban	Rural	Urban	Rural	1980	2025	1980	2025	(6)/(5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)/(7)
Argentina	13.5	9.2	17.0	12.1	86.7	92.0	81.6	89.1	.97
Bolivia	4.3	5.9	8.2	10.1	37.2	62.7	44.7	67.7	1.11
Brazil	6.6	5.4	15.6	13.2	67.3	87.1	62.8	83.7	.97
Chile	8.0	8.6	18.0	19.6	77.6	88.9	78.7	87.7	1.03
Colombia	5.6	5.6	9.7	9.9	66.4	84.9	66.3	84.9	1.00
Costa Rica	6.5	4.8	15.9	16.0	53.0	76.4	45.7	72.0	.92
Cuba	11.7	8.0	25.9	19.3	74.6	89.4	67.0	86.2	.93
Dominican Republic	4.3	4.4	14.1	14.9	45.8	78.4	46.8	73.5	1.09
Ecuador	5.1	5.4	12.3	13.2	43.5	66.0	44.8	67.5	1.01
El Salvador	6.0	4.4	10.9	8.5	51.9	71.5	44.2	66.2	.92
Guatemala	5.2	4.1	7.4	7.5	42.5	54.4	36.5	54.9	.86
Honduras	4.6	4.3	8.7	8.3	40.7	69.4	38.8	70.2	.94
Mexico	5.1	5.2	13.4	14.0	65.3	83.6	65.5	84.1	1.00
Nicaragua	4.3	3.4	8.8	7.2	59.9	78.3	53.8	76.0	.93
Panama	6.8	5.9	10.8	9.7	58.7	77.7	55.3	75.9	.96
Paraguay	6.6	4.7	10.8	7.9	46.9	62.5	38.6	55.0	.94
Peru	5.0	5.8	12.2	14.3	59.6	80.4	63.4	80.7	1.06
Uruguay	15.3	11.8	18.9	14.7	87.0	91.0	83.8	88.7	.99
Venezuela	4.3	5.2	12.9	15.6	72.5	84.8	76.2	87.2	1.02

Source: Pelaez and Arguello (1983)

Table 8: Probability of Surviving to Age 60 and Life Expectancy at Age 60: 1960 - 2025

	1960-65		1990-95		2020-25	
	S(60)	E(60)	S(60)	E(60)	S(60)	E(60)
Argentina	.73	17.1	.82	19.2	.88	22.4
Boliva	.43	13.8	.65	16.1	.81	20.7
Brazil	.58	16.8	.73	19.5	.83	22.5
Chile	.61	16.6	.84	20.0	.89	22.4
Colombia	.63	16.0	.78	18.9	.86	20.8
Costa Rica	.71	17.8	.88	21.1	.92	22.7
Cuba	.74	17.6	.86	21.2	.90	23.3
Dominican Republic	.57	15.7	.80	19.2	.88	22.4
Ecuador	.59	16.8	.77	20.0	.84	22.0
El Salvador	.55	15.5	.74	19.1	.85	21.1
Guatemala	.46	15.2	.71	19.0	.83	20.8
Honduras	.48	14.8	.75	19.9	.84	22.6
Mexico	.62	17.4	.79	20.3	.86	22.8
Nicaragua	.48	14.7	.75	19.4	.85	21.4
Panama	.69	17.2	.84	20.3	.90	22.0
Paraguay	.73	17.1	.81	19.1	.87	22.3
Peru	.52	14.6	.76	17.6	.85	21.2
Uruguay	.78	18.0	.84	19.2	.89	20.1
Venezuela	.65	16.7	.82	19.2	.89	22.2
Barbados	.76	16.9	.89	19.5	.94	21.1
Jamaica	.72	16.5	.86	18.5	.93	20.7
Trinidad	.73	16.7	.86	18.5	.93	20.7
Puerto Rico	.82	17.6	.93	20.7	.97	22.0
United States	.82	17.5	.93	20.7	.97	22.0
Japan	.83	17.8	.95	22.0	.98	23.2

Sources: Life expectancy estimated in UN (1997) and West Model of Mortality (Coale, Demeny, and Vaughn 1983).

Table 9: Decomposition of Gains in Life Expectancy at Age 60
Between 1970 and 1990 by Causes of Death and Age

	Number of Years of Life Gained by Causes of Death				
	Respiration TB	Other Infections	Neoplasm	Cardiovascular Diseases	Influenza Pneumonia Bronchitis
Argentina					
60-64	.02	-.01	.09	.16	.02
65-69	.01	-.01	.11	.24	.03
70-74	.01	-.02	.10	.27	.02
75+	.01	-.05	.06	.14	.00
Chile					
60-64	.07	.00	.11	.31	.09
65-69	.05	.00	.12	.34	.10
70-74	.04	-.01	.08	.40	.12
75+	.03	-.02	.04	.33	.09
Cuba					
60-64	.02	.00	.02	.01	.03
65-69	.02	.00	.10	.15	.04
70-74	.02	.01	.12	.35	.08
75+	.03	-.01	-.17	-.13	-.01
Barbados					
60-64	.02	.05	.01	.22	.04
65-69	.00	-.07	-.07	.32	.10
70-74	.00	-.03	-.25	.25	.06
75+	.00	-.17	-.22	.22	.19
Mexico					
60-64	.03	.10	-.03	.12	.17
65-69	.03	.10	-.04	.10	.21
70-74	.03	.10	-.05	.10	.21
75+	.01	.14	-.09	-.18	.28
Uraguay					
60-64	.01	.00	.01	.20	.03
65-69	.00	.00	.05	.26	.03
70-74	.01	.00	.03	.18	.02
75+	.01	-.01	-.03	.28	.03
Guatalmala					
60-64	.01	.44	-.01	.03	.25
65-69	.02	.46	.01	.04	.24
70-74	.01	.36	-.04	-.05	.22
75+	.01	.32	-.04	-.14	.13

Source: WHO Cause of Death Data Base

Table 10: Self-Reported Health Conditions for Population 60+ circa 1980

	Poor		Fair		Good		Very Good/Excellent	
	M	F	M	F	M	F	M	F
Argentina	3.4	10.5	33.6	43.3	53.4	41.4	9.7	7.2
Costa Rica	17.7	20.7	38.5	42.8	33.1	27.8	10.6	8.7
Trinidad and Tobago	26.6	37.6	32.6	37.1	32.6	19.8	7.9	5.3
	Æ È Ç				Æ È Ç			
Brazil	61.4		72.8		38.6		27.2	
Colombia	55.3		66.7		44.7		33.3	
El Salvador	78.8		77.6		22.2		18.4	
Jamaica	79.7		86.0		20.3		14.0	
Venezuela	82.7		77.3		17.3		22.7	
USA (HRS)								
Blacks	12.6	12.0	22.5	22.7	30.6	33.1	34.3	32.2
Whites	7.7	6.7	12.3	14.3	28.8	25.8	51.2	54.6
USA (AHEAD)								
Blacks	20.4	19.7	30.0	29.7	28.0	27.6	21.6	22.9
Whites	12.5	11.5	21.0	22.5	32.0	30.1	34.6	35.9

Sources: For Countries in the Region. PAHO Country Profiles.
For US, Smith and Kingston (1997)

Table 11: Rates of labor force participation, population 65+: 1970-1990

	1970		1990	
	Males	Females	Males	Females
Argentina	28.4	4.6	27.4	9.4
Chile	41.7	6.5	20.9	4.5
Costa Rica	57.1	3.9	38.9	3.1
Cuba	27.8	1.9	21.4	2.0
Ecuador	78.8	9.1	64.3	14.0
Guatemala	68.6	7.1	66.8	6.5
Mexico	78.6	10.9	45.9	5.4
Peru	68.7	11.9	63.5	12.0
Uruguay	20.8	3.5	16.2	3.6
Venezuela	50.6	5.8	41.9	5.5
USA	26.0	13.0	23.0	12.0

Source: UN Demographic Yearbook and C. Taeuber (1992)

Table 11a: Rates of Labor Force Participation, Population 65+: 1970-1990

	1970		1990	
	Males	Females	Males	Females
Argentina	28.4	04.6	27.4	09.4
Chile	41.7	06.5	20.9	04.5
Costa Rica	57.1	03.9	38.9	03.1
Cuba	27.8	01.9	21.4	02.0
Ecuador	78.8	09.1	64.3	14.0
Guatemala	68.6	07.1	66.8	06.5
Mexico	78.6	10.9	45.9	05.4
Peru	68.7	11.9	63.5	12.0
Uruguay	20.8	03.5	16.2	03.6
Venezuela	50.6	05.8	41.9	05.5
USA	26.0	13.0	23.0	12.0

Source: United Nations Demographic Yearbook (1993) and C. Taeuber (1992)

Table 11b: Rates of Labor Force Participation, Male Population 60+: 1970-80

		Total	Illiterate	Primary or Less	More
Argentina	1970	40	48	39	40
	1981	28	30	27	34
Bolivia	1976	81	87	73	64
Brazil	1970	60	65	56	50
	1980	47	46	49	48
Chile	1970	48	43	50	51
	1982	37	32	38	39
Colombia	1973	56	55	57	55
	1985	56	56	56	54
Costa Rica	1973	62	64	62	56
	1984	43	43	44	38
Dom. Rep.	1970	80	80	80	76
	1981	78	80	76	66
Ecuador	1974	79	82	77	64
	1982	74	76	75	63
Guatemala	1981	75	76	74	65
Mexico	1970	72	72	73	71
Nicaragua	1971	69	69	68	75
Panama	1970	64	72	58	54
	1980	45	54	43	35
Paraguay	1972	74	72	76	70
	1982	64	63	65	65
Venezuela	1981	51	49	51	62

Source: Sample of decennial census

Table 12: Marital Status Distribution of Population 65+ :circa 1980-1990

	Never Married	Married	Consensual Union	Widowed	Divorced/ Separated
Argentina 1980					
Male	10.8	66.8	04.7	15.7	01.9
Female	12.3	32.0	02.8	51.4	01.5
Bolivia 1976					
Male	04.6	68.7	---	24.4	01.6
Female	07.7	38.3	---	49.7	01.9
Brazil 1980					
Male	05.2	67.4	07.2	15.5	01.7
Female	09.2	29.0	02.1	53.2	02.9
Chile 1985					
Male	10.0	67.6	02.3	16.9	03.0
Female	12.6	30.4	01.4	49.8	05.9
Colombia 1985					
Male	08.1	60.9	10.1	16.0	03.9
Female	13.1	26.1	03.2	50.4	05.1
Costa Rica 1984					
Male	15.0	62.5	07.7	14.5	04.8
Female	17.6	34.1	03.6	39.2	05.5
Cuba 1981					
Male	13.0	47.1	18.5	13.6	07.8
Female	08.8	29.1	10.3	42.8	09.0
Ecuador 1982					
Male	07.5	58.2	13.9	15.6	03.1
Female	12.6	35.2	07.6	37.8	04.2
Guatemala 1981					
Male	04.3	28.4	29.0	18.6	02.4
Female	08.3	22.8	12.3	66.6	04.5
Mexico 1980					
Male	05.2	69.6	08.2	14.9	02.0
Female	08.7	40.4	05.1	42.6	03.0
Panama 1980					
Male	11.6	43.5	20.8	13.9	10.1

Female	11.2	23.3	10.6	41.8	13.2
Paraguay 1982					
Male	09.1	68.2	07.8	11.7	01.9
Female	25.8	33.7	04.0	32.4	02.2
Peru 1981					
Male	06.1	61.3	09.3	20.2	01.9
Female	08.3	32.7	05.5	48.4	02.6
Uruguay 1975					
Male	12.4	64.9	03.2	14.6	10.6
Female	15.1	29.3	01.8	48.7	03.5
Venezuela 1981					
Male	13.1	46.2	20.7	11.0	03.6
Female	23.1	20.3	10.9	35.6	05.7

Sources: Samples of decennial census

Table 13a. Distribution of Household Composition (Hammel/ Laslett typology) among Elderly People 60 Years and Over by Marital Status and Sex, Selected Countries Latin American, 1970-1980 (a)

	Total				Males				Females			
	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families
Argentina 1970												
Total	10	2	42	46	10	2	52	36	11	2	33	54
Unmarried	21	5	13	61	31	7	14	49	17	4	12	67
Married	--	-	69	31	--	-	70	30	--	-	69	31
Argentina 1980												
Total	11	3	40	47	9	2	50	39	12	3	32	53
Unmarried	22	5	11	62	29	7	12	53	20	4	11	65
Married	--	-	66	34	--	-	66	34	--	-	66	34
Bolivia 1976												
Total	12	1	33	54	10	1	41	48	13	1	26	60
Unmarried	23	2	13	62	28	3	16	53	21	2	12	66
Married	--	-	53	47	--	-	54	46	--	-	52	48
Brazil 1970												
Total	7	.1	52	40	5	.5	65	29	9	1	38	52
Unmarried	17	2	17	64	24	2	21	53	14	2	16	68
Married	--	-	78	22	--	-	78	22	--	-	77	23
Brazil 1980												
Total	8	1	45	45	7	.7	56	36	10	2	35	53
Unmarried	21	3	17	59	31	3	20	47	17	3	16	64
Married	--	-	66	34	--	-	67	33	--	-	63	37
Chile 1970												
Total	6	3	32	59	7	2	40	52	6	3	26	65
Unmarried	12	5	16	67	18	5	20	57	9	5	14	72
Married	--	-	52	48	--	-	53	47	-	-	50	50
Chile 1982												
Total	8	2	32	58	7	2	40	51	8	3	26	63
Unmarried	15	5	12	68	22	5	15	59	13	5	11	72
Married	--	-	52	48	--	-	53	47	--	-	52	48
Colombia 1973												
Total	6	2	26	66	6	2	35	58	6	2	18	74
Unmarried	10	4	12	74	15	5	16	64	8	3	11	78
Married	--	-	44	56	--	-	46	54	-	-	39	60
Colombia 1985												
Total	6	2	30	62	6	1	37	55	6	2	22	69
Unmarried	12	3	14	71	19	5	15	61	9	3	13	75
Married	--	-	47	53	--	-	48	52	-	-	44	56

Table 13a. Distribution of Household Composition (Hammel/ Laslett typology) among Elderly People 60 Years and Over by Marital Status and Sex, Selected Countries Latin American, 1970-1980 (a)

	Total				Males				Females			
	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families
Costa Rica 1973												
Total	6	1	35	58	5	.9	43	51	6	2	28	65
Unmarried	12	3	15	71	18	3	14	65	9	3	15	74
Married	--	-	54	46	--	-	56	44	-	-	51	49
Costa Rica 1984												
Total	8	1	37	54	8	1	44	48	8	1	30	61
Unmarried	17	3	13	67	25	3	13	58	13	2	13	71
Married	--	-	56	44	--	-	57	43	--	-	55	45
Dom. Rep. 1970												
Total	7	3	32	58	8	3	41	49	6	3	23	67
Unmarried	12	5	19	64	21	8	20	48	8	4	17	71
Married	-	-	49	51	--	-	51	49	-	-	42	57
Dom. Rep. 1981												
Total	7	1	25	66	9	1	32	58	6	2	17	75
Unmarried	15	3	11	71	26	4	14	56	9	2	10	79
Married	--	-	39	61	--	-	41	59	-	-	34	66
Ecuador 1974												
Total	8	2	29	62	8	1	36	55	7	2	22	69
Unmarried	15	3	12	69	23	4	15	58	12	3	10	75
Married	--	-	45	55	--	-	46	54	--	-	42	58
Ecuador 1982												
Total	9	1	31	60	9	1	36	54	8	1	25	66
Unmarried	19	3	12	67	27	4	14	55	14	2	11	73
Married	--	-	46	54	--	-	47	53	--	-	46	54
Guatemala 1981												
Total	5	.8	32	62	5	.6	40	54	6	1	24	69
Unmarried	12	2	12	74	20	2	11	67	9	2	12	78
Married	--	-	48	52	--	-	50	50	-	-	45	55
Mexico 1970												
Total	8	.1	55	37	6	.09	66	28	10	.1	44	46
Unmarried	17	.2	26	57	23	.35	27	49	15	.16	26	59
Married	--	-	79	21	--	-	79	21	--	-	79	21
Nicaragua 1971												
Total	8	1	24	66	9	.9	33	57	7	2	17	74
Unmarried	14	3	11	72	27	2	12	59	10	3	10	78
Married	--	-	42	58	--	-	44	55	--	-	36	64

Table 13a. Distribution of Household Composition (Hammel/ Laslett typology) among Elderly People 60 Years and Over by Marital Status and Sex, Selected Countries Latin American, 1970-1980 (a)

	Total				Males				Females			
	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families	Solitary Individual	No Family	Simple Families	Complex Families
Total	12	2	25	61	15	2	31	52	9	1	21	69
Unmarried	21	3	11	65	35	5	12	47	13	2	10	75
Married	--	-	45	55	--	-	45	55	--	-	45	55
Panama 1980												
Total	12	1	28	58	15	1	34	49	9	1	22	67
Unmarried	24	3	9	64	38	4	11	47	15	2	8	76
Married	--	-	49	51	--	-	50	50	--	-	49	51
Paraguay 1972												
Total	7	2	27	64	7	2	36	55	8	2	20	70
Unmarried	14	3	12	71	23	5	14	58	11	3	11	75
Married	--	-	44	56	--	-	46	54	--	-	11	60
Paraguay 1982												
Total	7	1	29	63	5	1	37	57	8	2	22	68
Unmarried	14	3	12	71	20	4	14	62	12	2	12	74
Married	--	-	44	56	--	-	45	55	--	-	42	58
Venezuela 1981												
Total	8	2	23	67	9	2	29	60	7	1	18	74
Unmarried	14	3	9	74	23	4	10	62	9	2	9	80
Married	--	-	41	59	--	-	42	58	-	-	39	61

Source: Samples of Decennial Census

(a) Our modified Hammel/Laslett household composition typology has four categories: Solitary households only contain one person. No family households only contain members who are unrelated to the head. Simple families are comprised of family members who all belong to the same conjugal unit whether or not a conjugal pair is currently present. Complex families contain members who belong to more than one conjugal unit. Since they reflect the *family* nature of the households, neither simple nor complex family households in this simple form reflect whether an unrelated individual is also present.

Table 13b. Proportion of All and Unmarried Elders (60+) Living Alone by Sex - Selected Latin American Countries 1970-1985.

	Total			Unmarried		
	Total	Men	Women	Total	Men	Women
Argentina 1970	10	10	11	21	31	17
1980	11	9	12	22	29	20
Bolivia 1976	12	10	13	23	28	21
Barbados 1982	27	-	-	-	-	-
Brazil 1970	7	5	9	17	24	14
1980	8	7	10	21	31	17
Chile 1970	6	7	6	12	18	9
1982	8	7	8	15	22	13
Colombia 1973	6	6	6	10	15	8
1985	6	6	6	12	19	9
Costa Rica 1973	6	5	6	12	18	9
1984	8	8	8	17	25	13
Cuba 1981	10	-	-	-	-	-
Dom. Rep. 1970	7	8	6	12	21	8
1981	7	9	6	15	26	9
Ecuador 1974	8	8	7	15	23	12
1982	9	9	8	19	27	14
Guatemala 1981	5	5	6	12	20	9
Jamaica 1984	23	-	-	-	-	-
Mexico 1970	8	6	10	17	23	15
Nicaragua 1971	8	9	7	14	27	10
Panama 1970	12	15	9	21	35	13
1980	12	15	9	24	38	15
Paraguay 1972	7	7	8	14	23	11
1982	7	5	8	14	20	12
Trinidad 1985	14	-	-	-	-	-
Uruguay 1985	16	-	-	-	-	-
Venezuela 1981	8	9	7	14	23	9

Source: Sampes of decennial census

(a) Unmarried refers to indivuals not in a union

(b) Refers to population 65 and over, from Martin and Kinsella, 1994

Table 14: Main Dimensions of Social Security Systems in the Region

Country	Approximate Year of Start	Proportion Population Covered (health)	Proportion Economically Active Population Covered	Cost of Social Security as Fraction of GDP	Cost of Pension as Fraction of Social Security	Ratio of Population Receiving to Population Contributing
Uruguay	1920	.69	.81	.11	.79	.65
Argentina	1920	.79	.69	.10	.55	.32
Chile	1920	.67	.62	.11	.53	.46
Cuba	1920	1.00	.93	.09	.44	.21
Brasil	1920	.96	.96	.05	.45	.18
Costa Rica	1940	.78	.68	.09	.21	.06
Panama	1940	.50	.46	.07	.34	.12
Mexico	1940	.53	.42	.03	.21	.08
Peru	1950	.17	.37	.03	.35	.09
Colombia	1940	.12	.22	.04	.20	.05
Bolivia	1960	.25	.18	.03	.40	.33
Ecuador	1940	.08	.23	.03	.48	.15
Paraguay	1950	.18	.14	.02	.31	.07
Venezuela	1970	.45	.50	.03	.33	.06
Dom. Republic	1940	.08	.14	.02	.21	-
Guatemala	1960	.14	.33	.02	.14	.06
El Salvador	1950	.06	.12	.02	.18	.08
Nicaragua	1950	.09	.19	.02	.16	.08
Honduras	1950	.07	.13	.03	.07	.02

Source: Mesa-Lago (1985)

Table 15: Main Features of Reform of Pension System: Selected Countries of the Region							
Characteristics	Chile	Peru	Argentina	Colombia	Mexico	Uruguay	Costa Rica
Starting Date	5/81	6/93	7/94	1/94	1/97	1/96	8/95*
Structure	unitary (all private)	dual (choice between private and public	mixed (combination of private and public)	dual	unitary	mixed	mixed
Legal Coverage	compulsory for civilian dependent workers; voluntary for civilian independent workers	compulsory for dependent workers; voluntary for independent workers	compulsory for all workers except army, police and provincial government employees	compulsory for dependent workers; voluntary for independent	compulsory for dependent workers; voluntary for independent, domestic and public sector workers	capitalization vs compulsory for all workers below age 40	public scheme compulsory; capitalization scheme is voluntary
Minimum Pension	Available as 80% of minimum wage	not yet implemented	partially implemented	available as 100% of minimum wage	available as 100% of minimum wage	available varying levels	available varying levels
Retirement Age	65 (males) 60 (females)	private scheme 65 (males) 60 (females) public scheme 65 (males) or 55 and 30 years of contributions; 60 (females) and 25 years of contributions	65 for all	62 (males) 57 (females)	65 and 1250 weeks of contributions	60 for all (varying with years of service	public scheme 62 (males) 60 (females) private scheme contractual

* Date law was passed.
Source: Barrientos (1997)

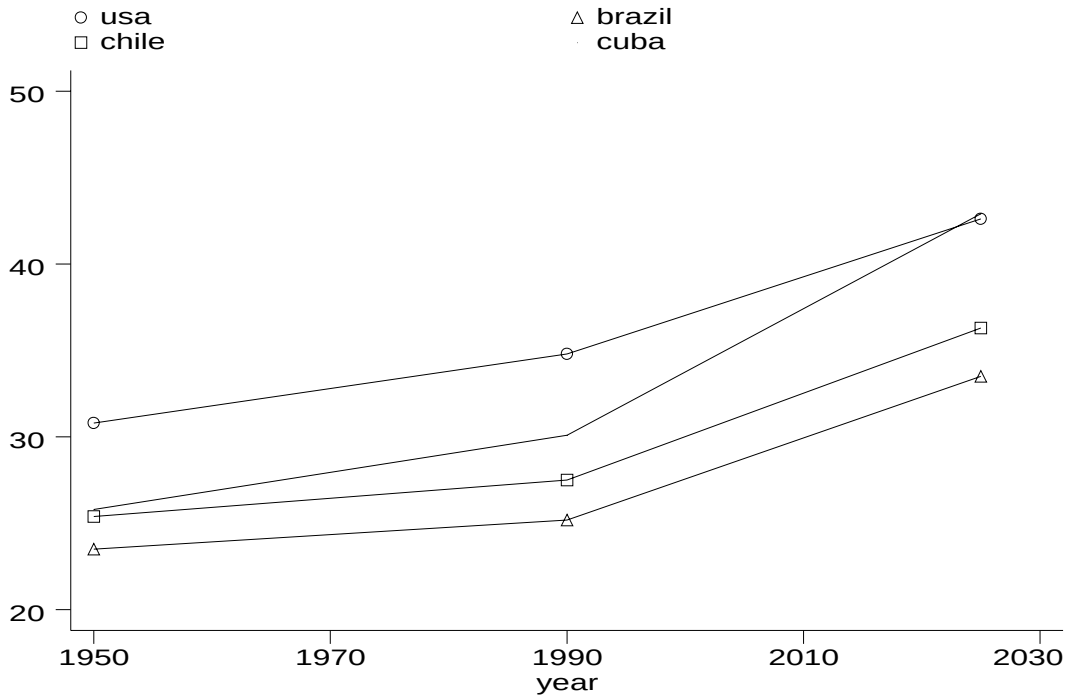


Figure 1: Trajectory of A(t)

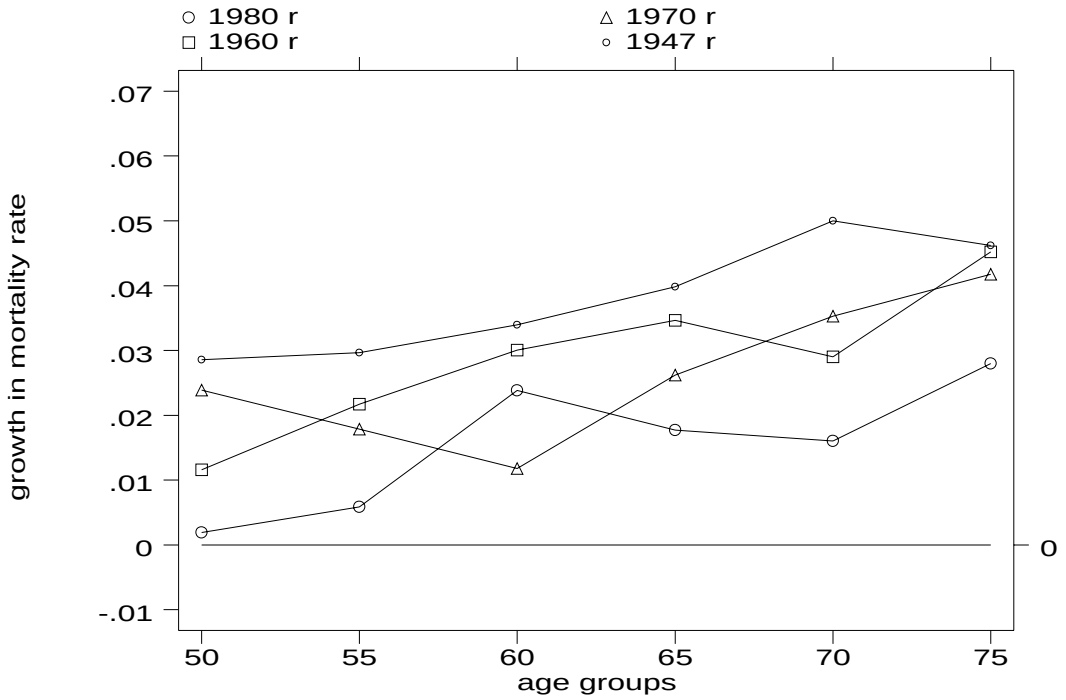


Fig. 2a: Argentina: Ages 50 and above (last observed year 1991.)

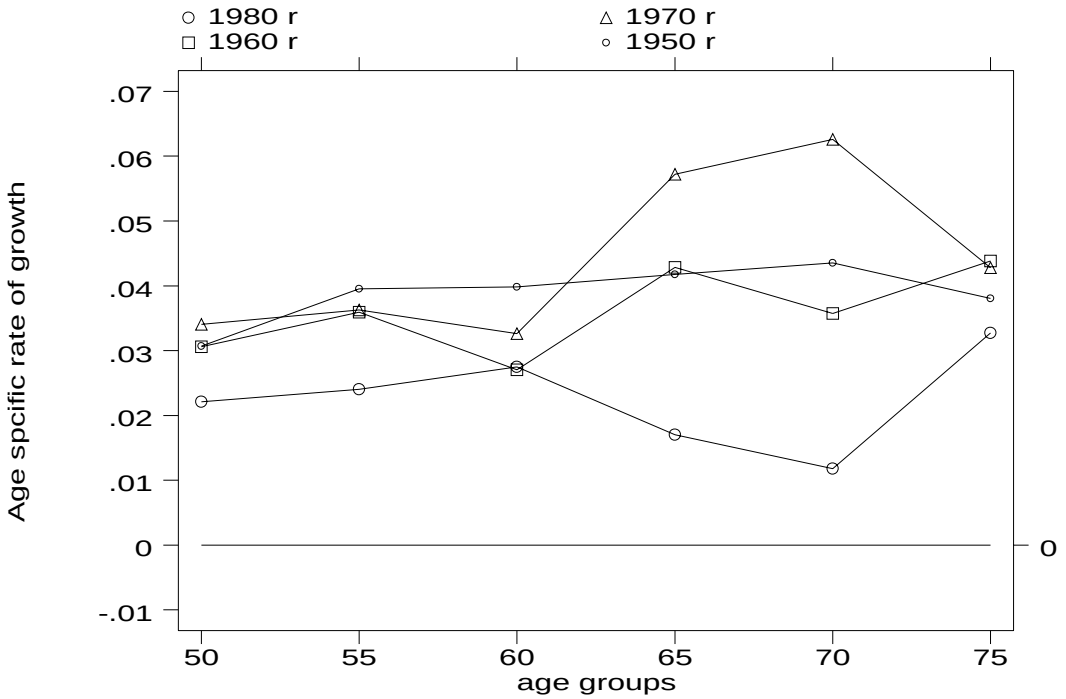


Fig. 2b: Brazil: Ages 50 and above (last observed year 1992.)

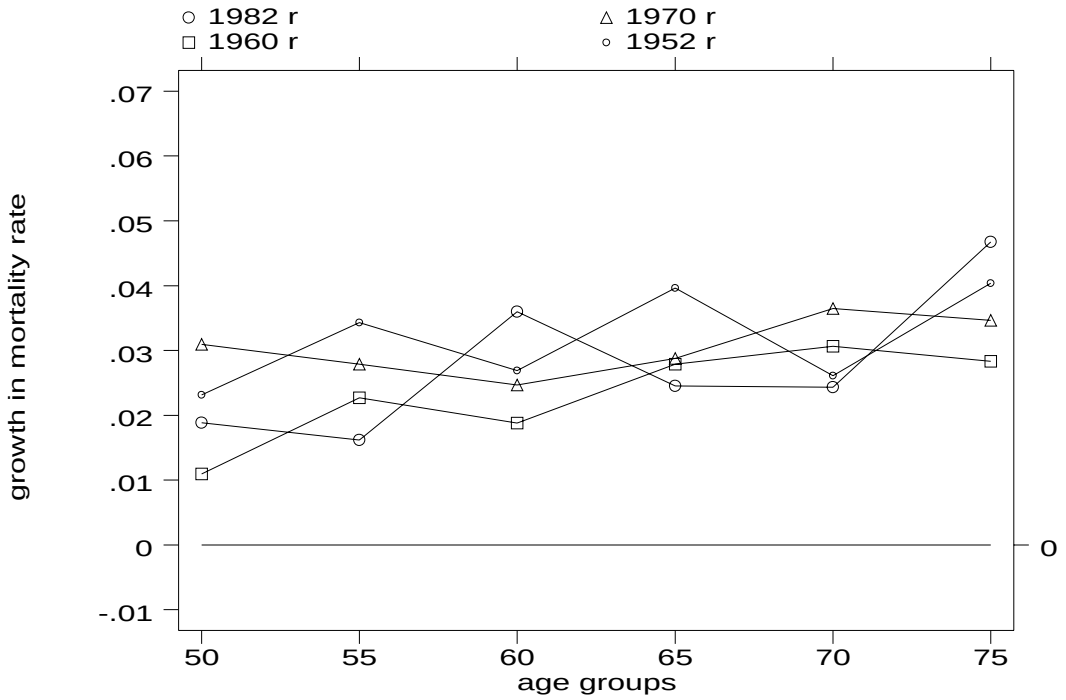


Fig. 2c: Chile: Ages 50 and above (last observed year 1992.)

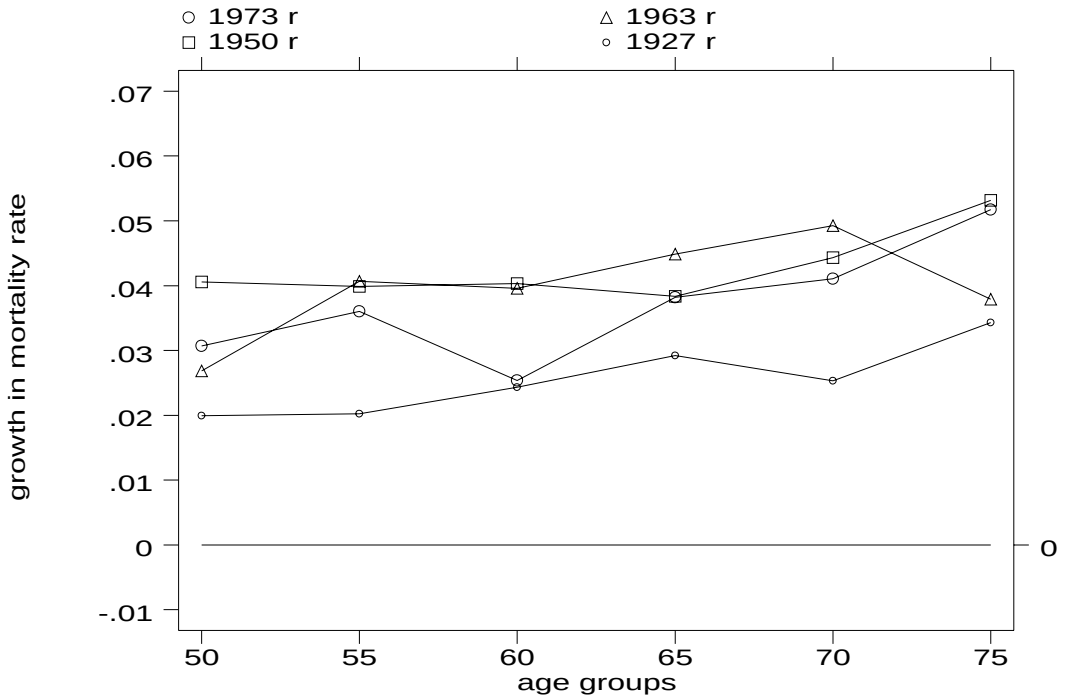


Fig. 2d: Costa Rica: Ages 50 and above (last observed year 1984.)

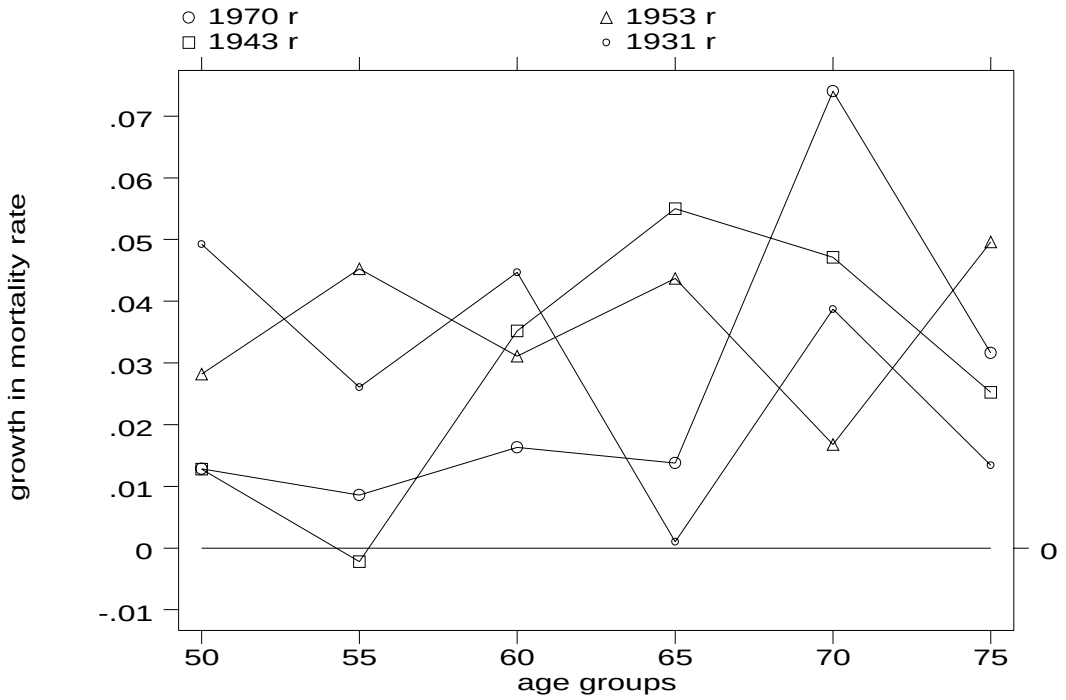


Fig. 2e: Cuba: Ages 50 and above (last observed year 1981.)

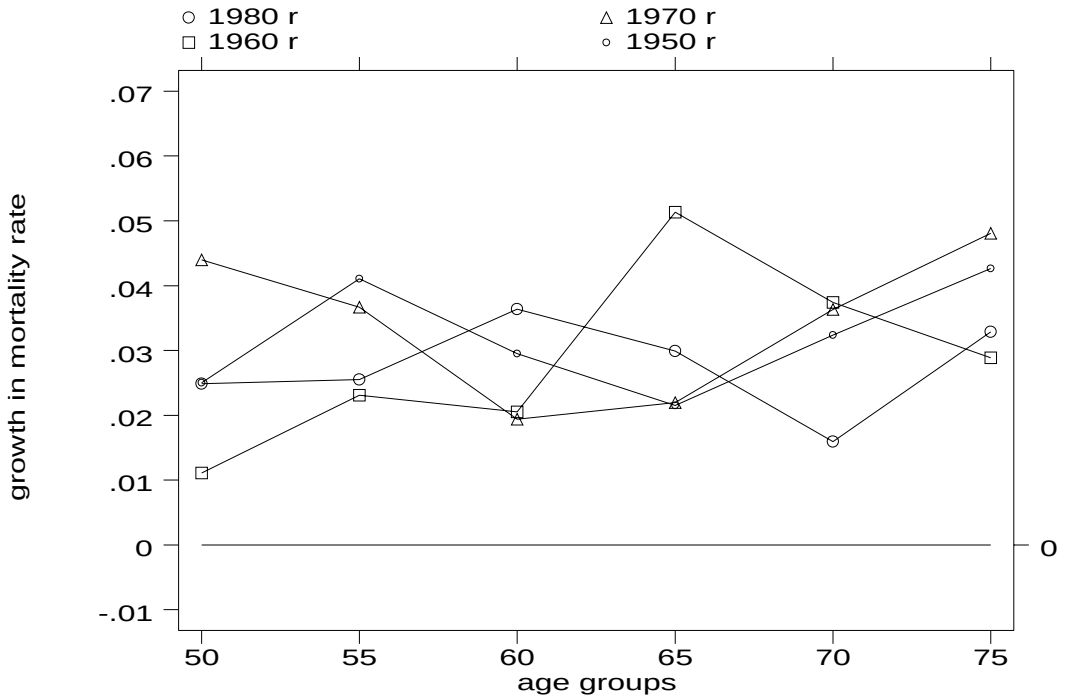


Fig. 2f: Mexico: Ages 50 and above (last observed year 1990.)

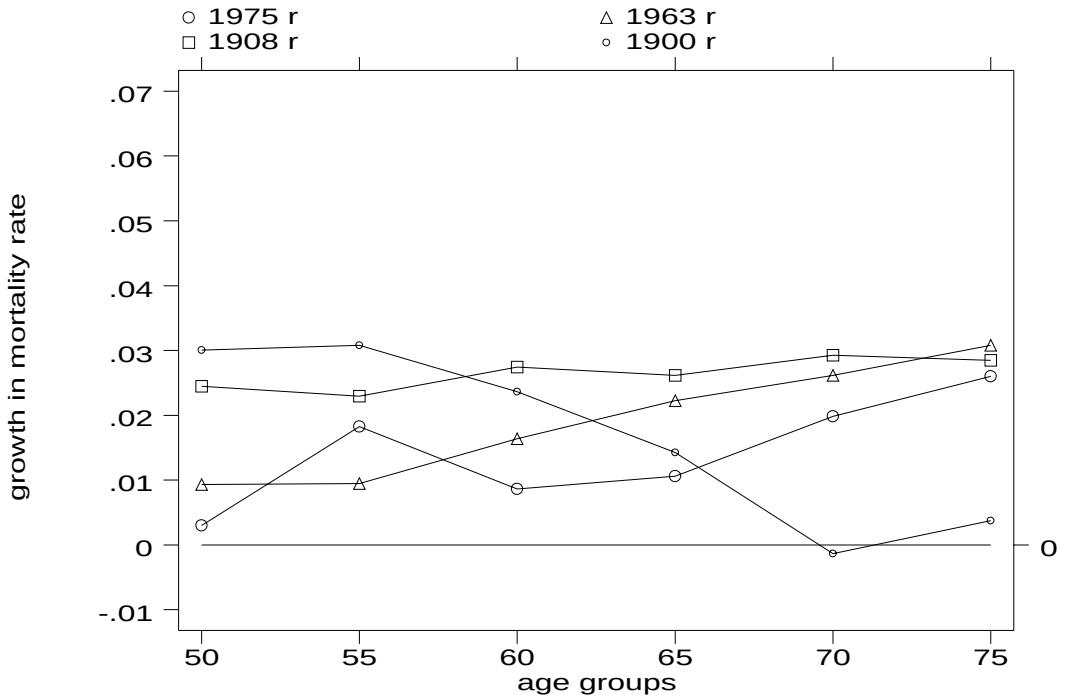


Fig. 2g: Uruguay: Ages 50 and above (last observed year 1985.)

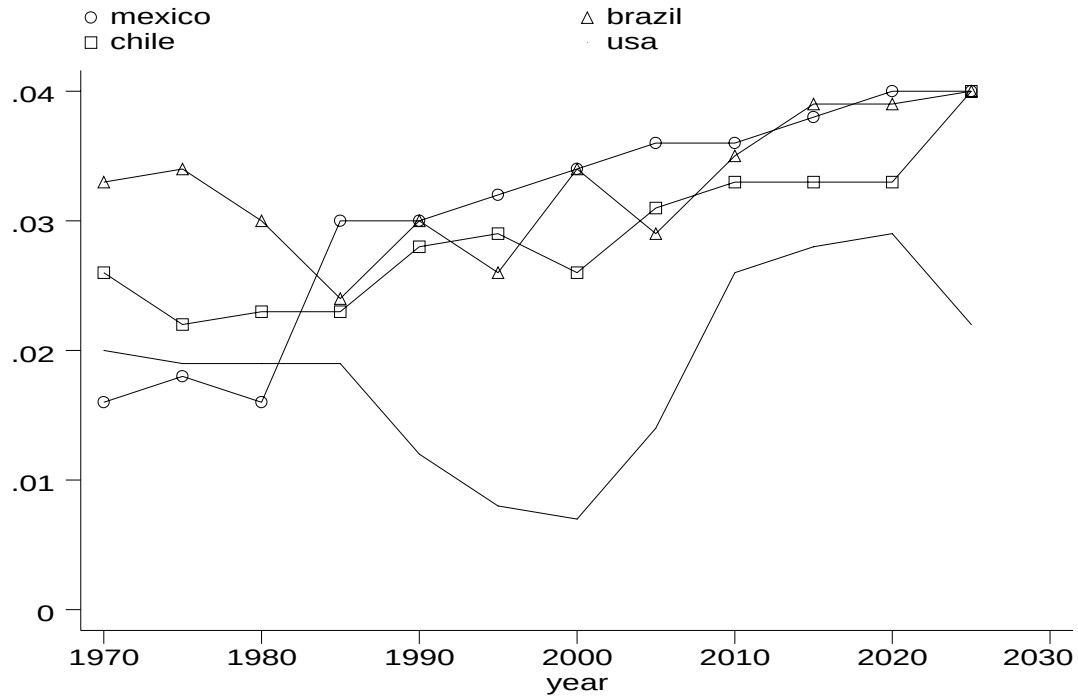


Figure 3: Rates of increase population 60+

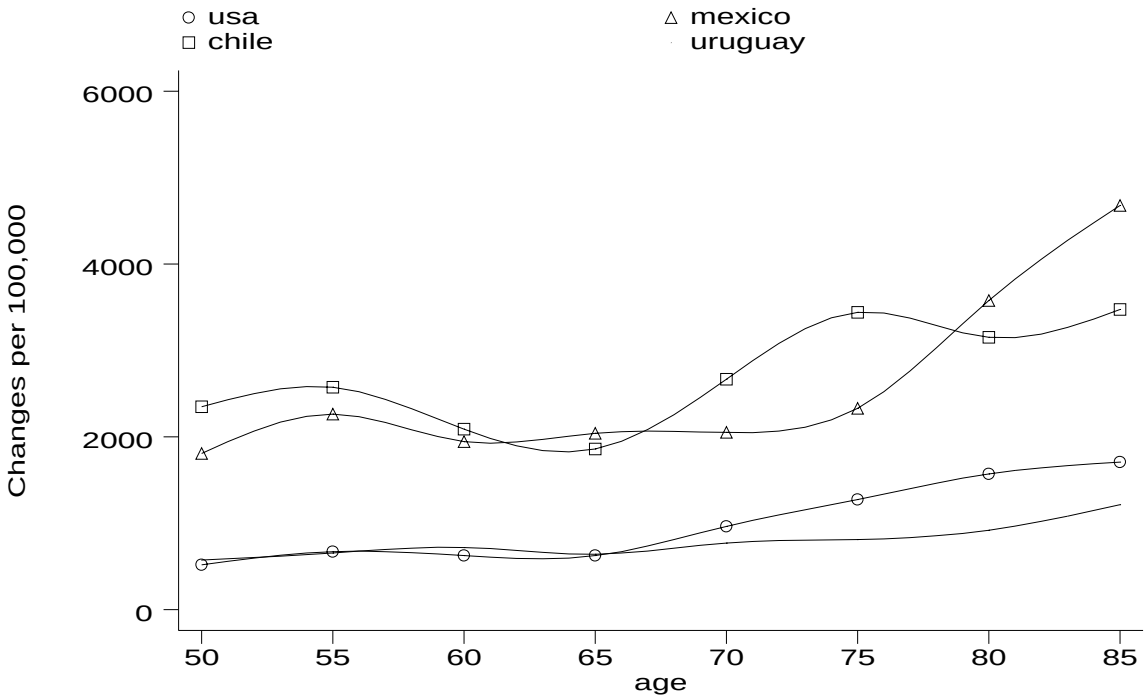


Figure 4a: Cumulated changes in mortality-1995

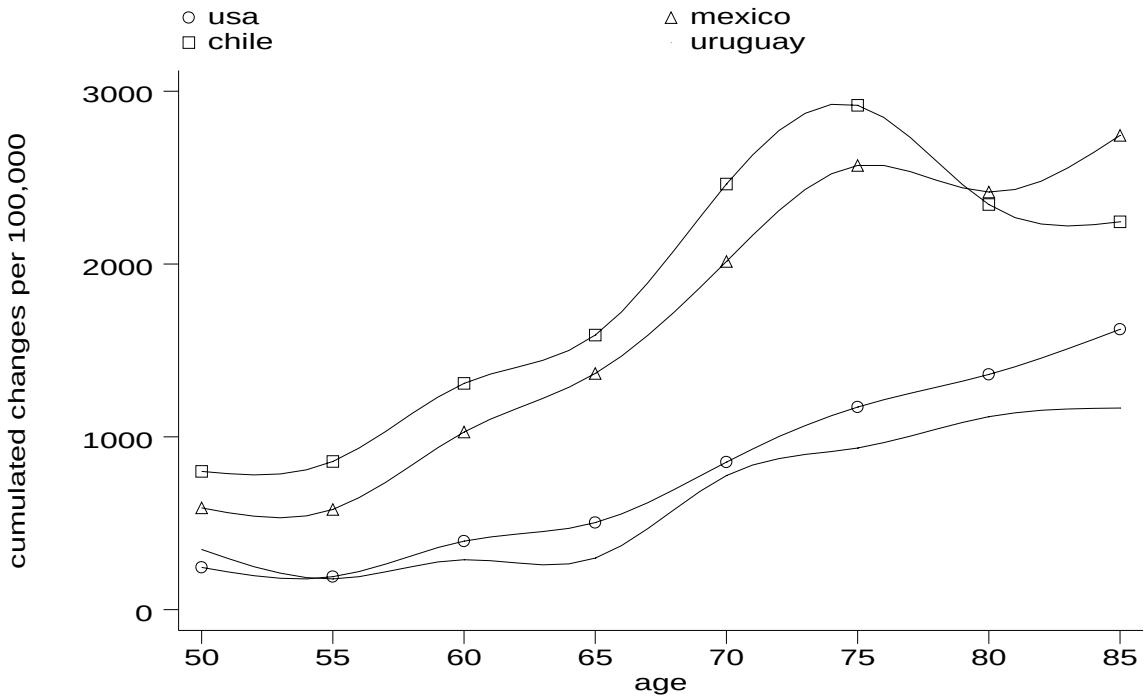
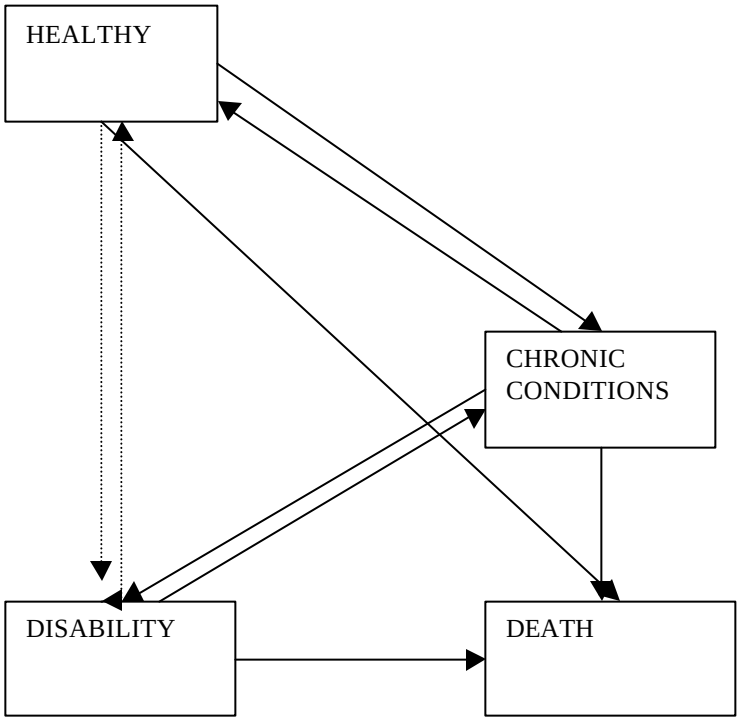


Figure 4b: Cumulated mortality change-2020

FIGURE 5: A MULTISTATE REPRESENTATION OF HEALTH AND DISABILITY STATUS



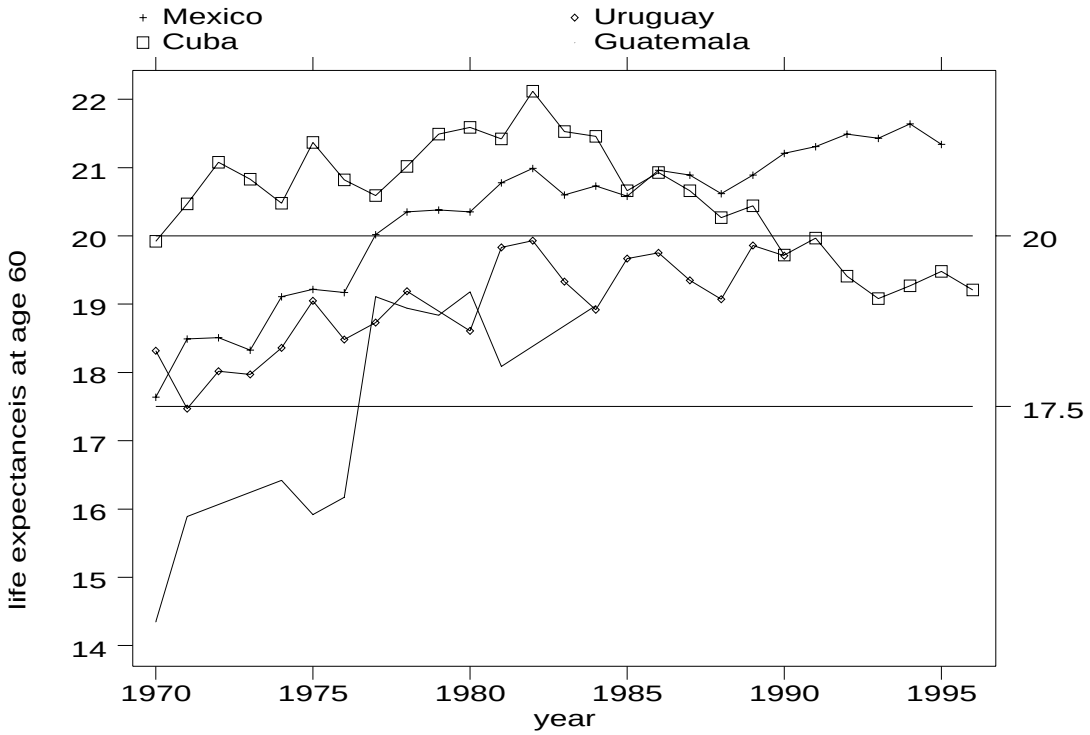


Figure 6a: Life Expectancies at Age 60

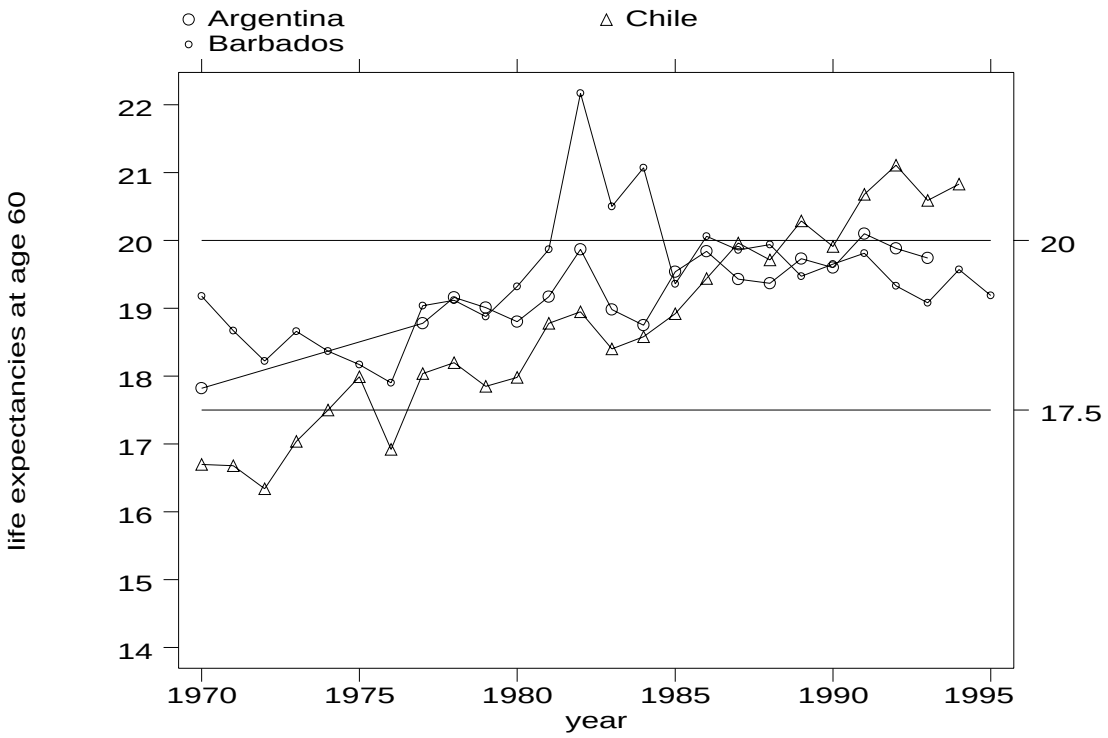


Figure 6b: Life Expectancies at Age 60

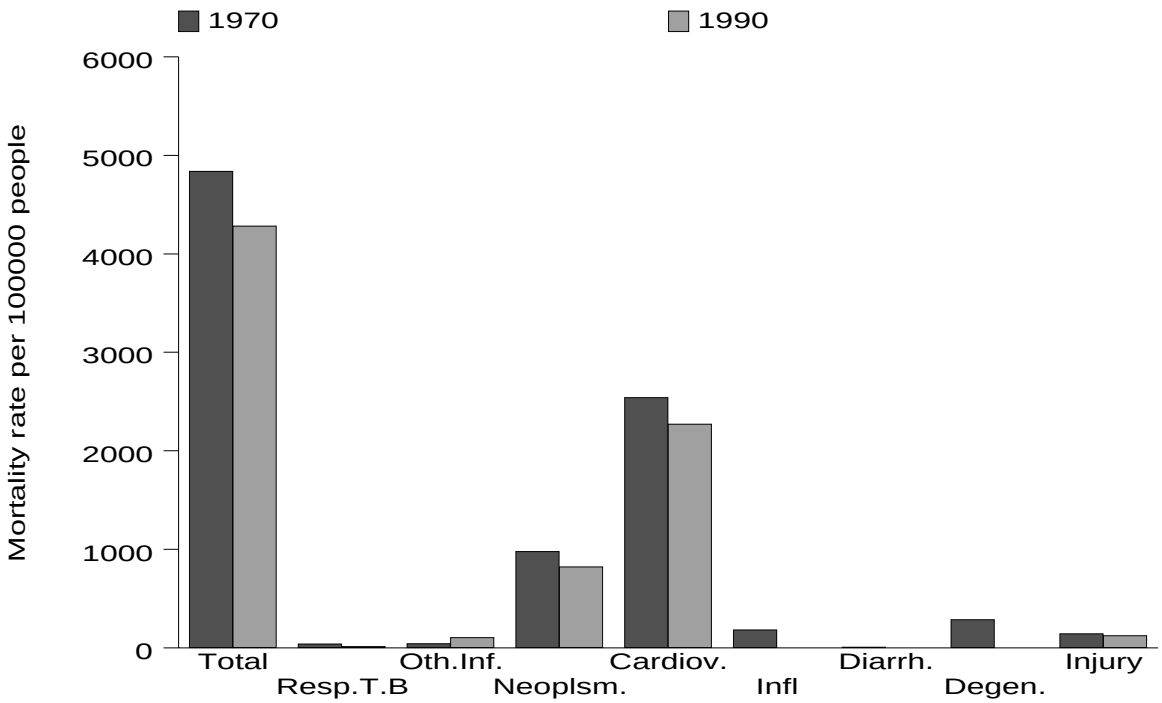


Figure 7a: Argentina 60+ Mortality by Cause

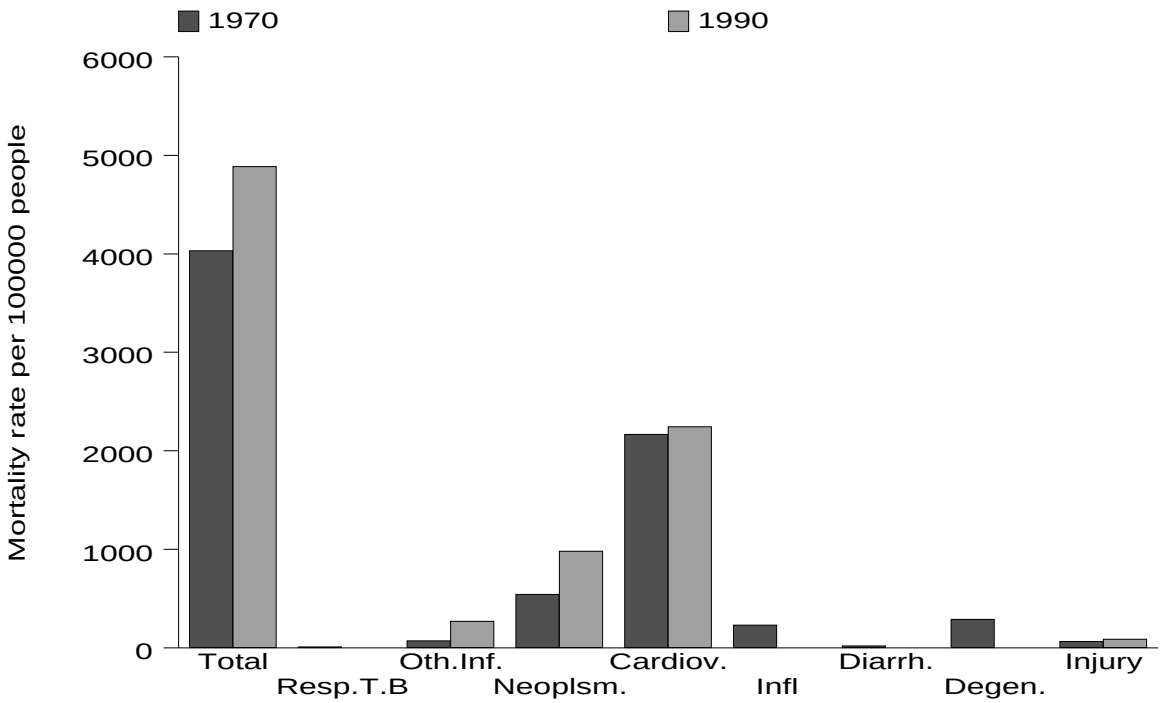


Figure 7b: Barbados 60+ Mortality by Cause

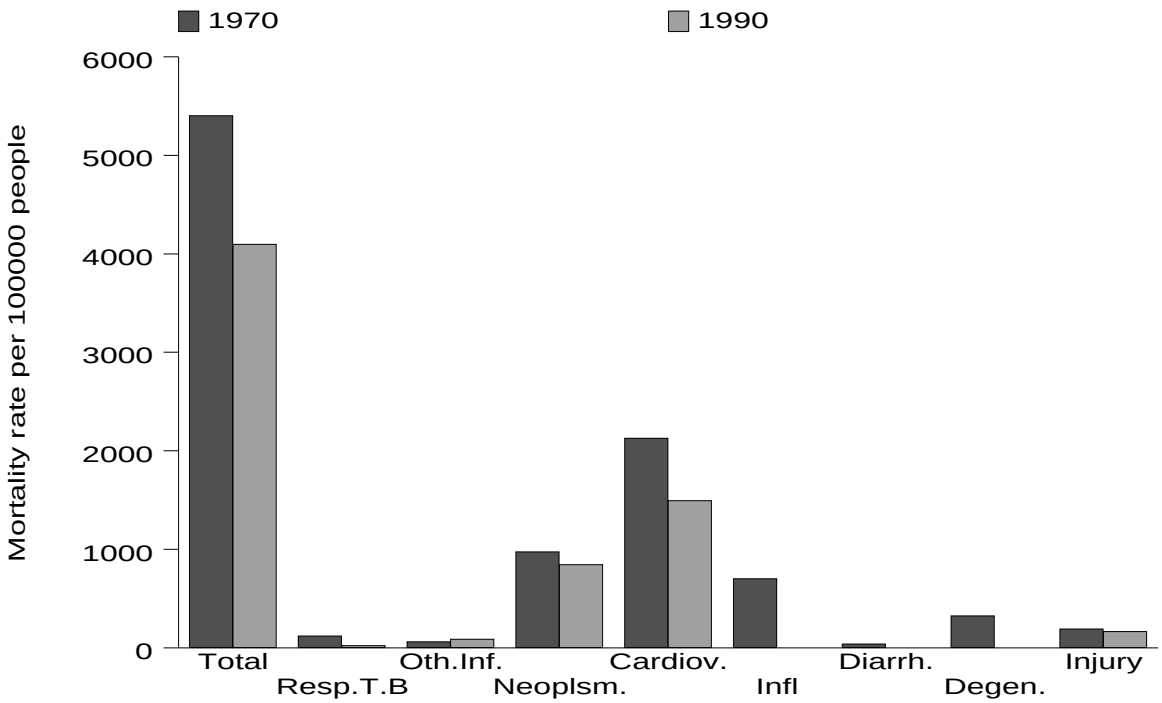


Figure 7c: Chile 60+ Mortality by Cause

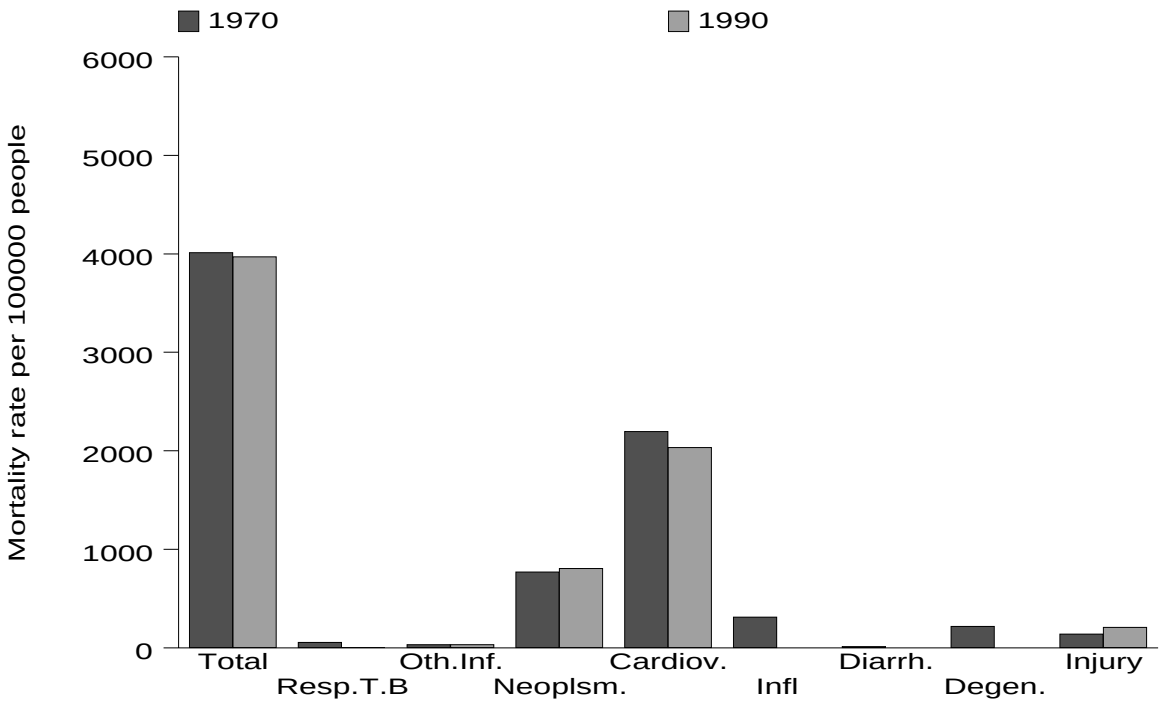


Figure 7d: Cuba 60+ Mortality by Cause

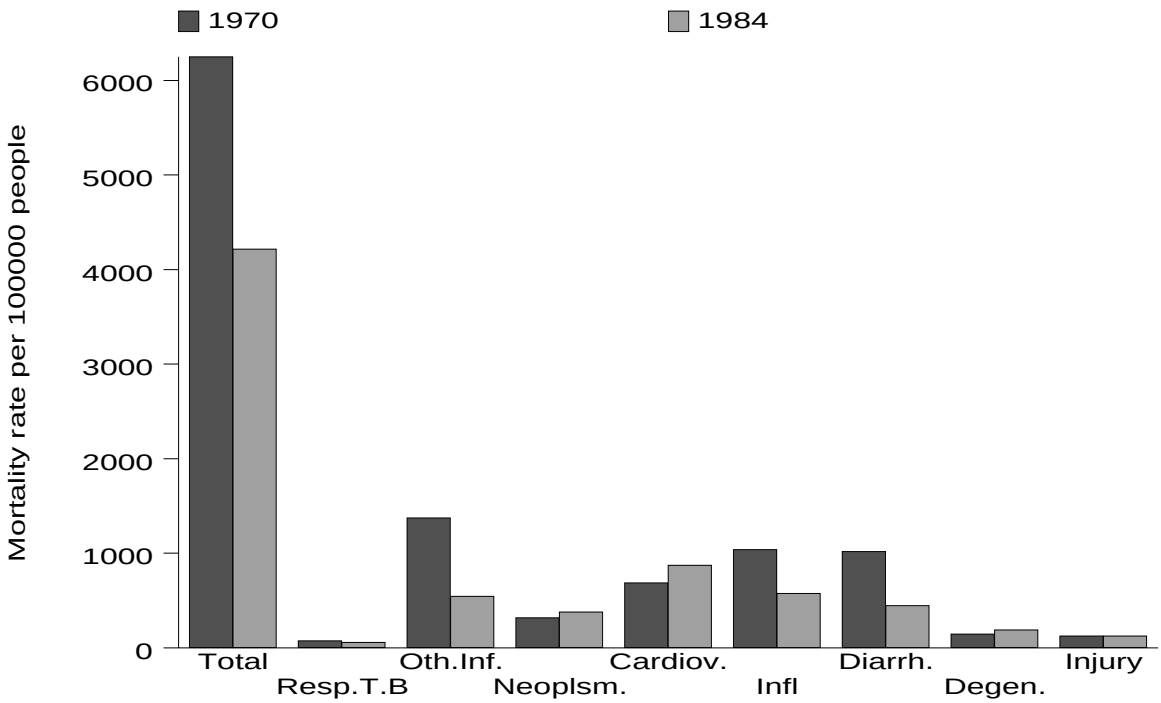


Figure 7e: Guatemala 60+ Mortality by Cause

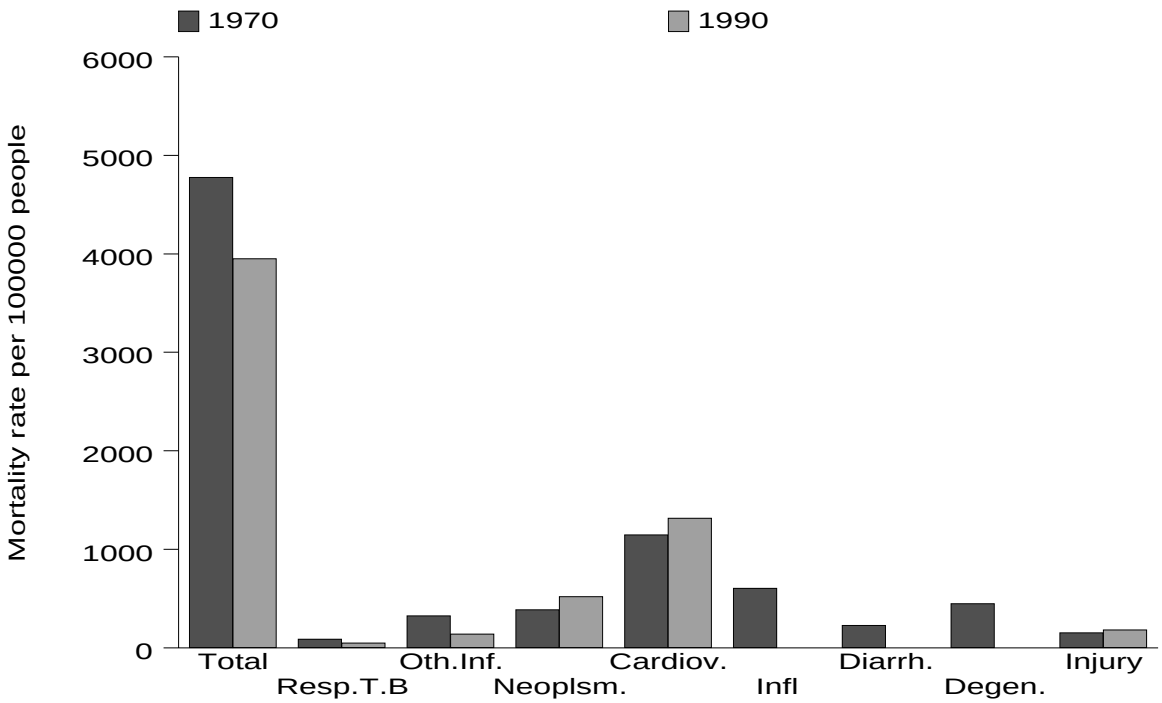


Figure 7f: Mexico 60+ Mortality by Cause

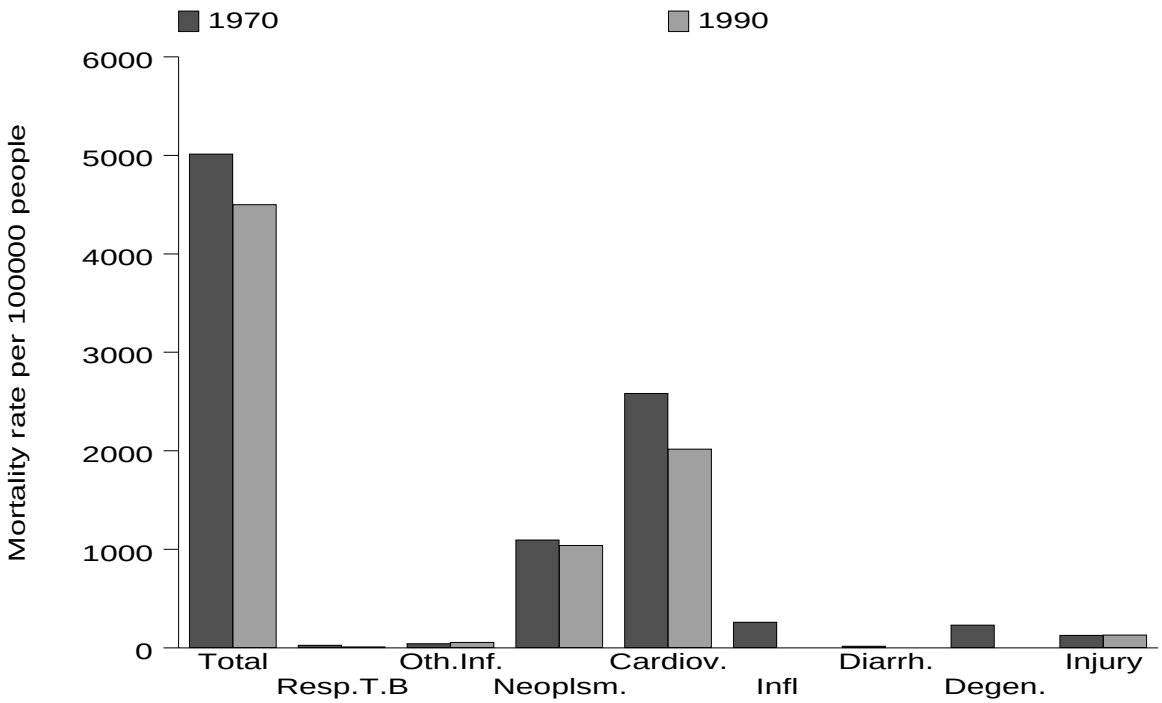


Figure 7g: Uruguay 60+ Mortality by Cause

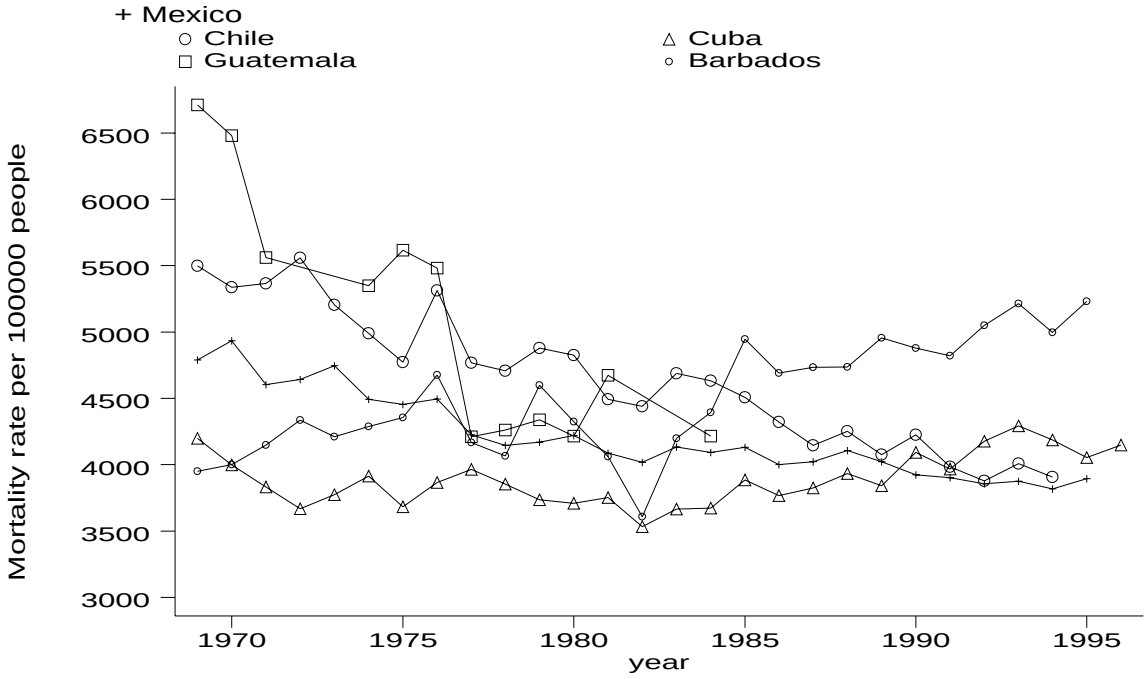


Figure 8a: Total Mortality Rate 60+ by Country by Year

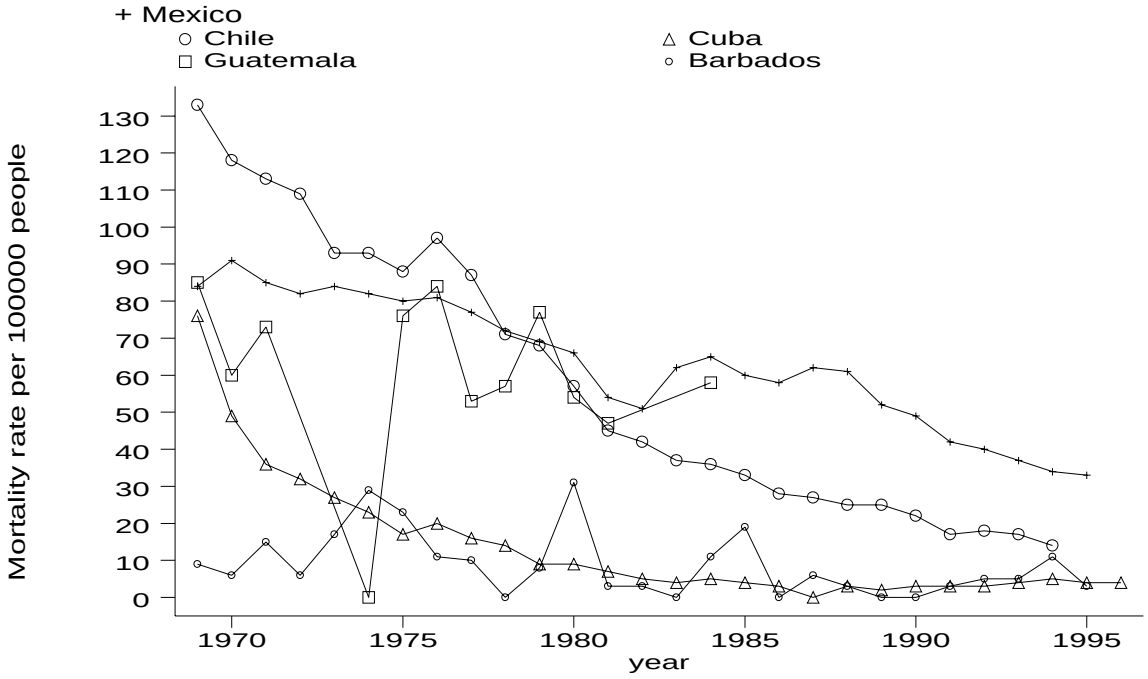


Figure 8b: Mortality Rate 60+ for Resp. T.B. by Country by Year

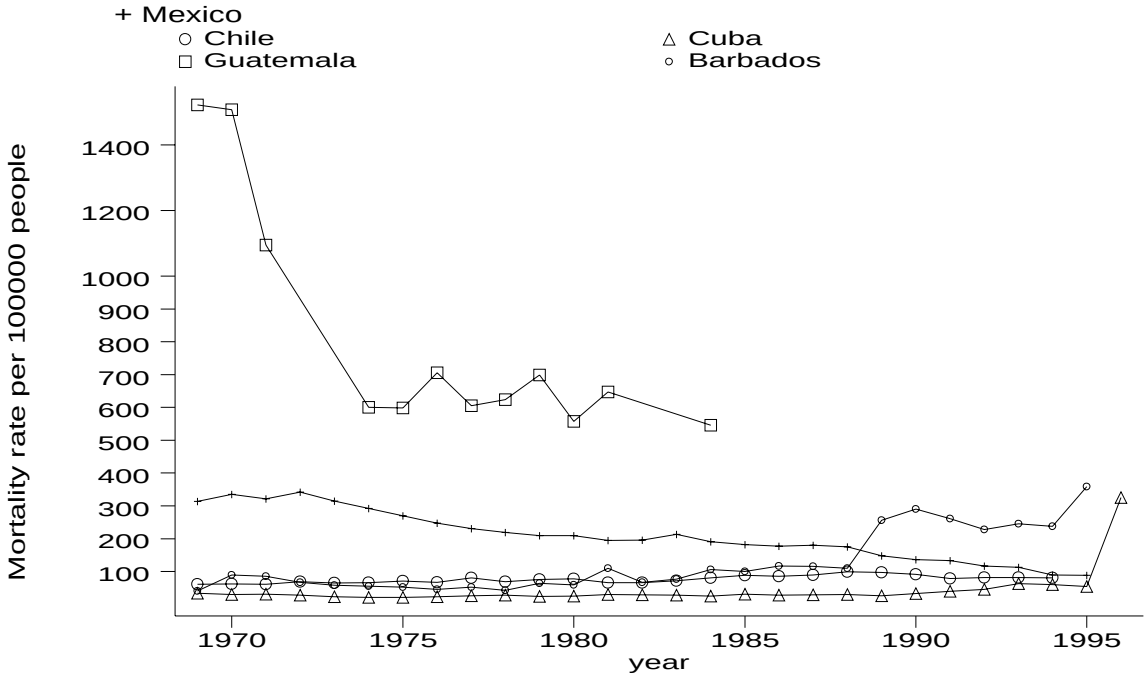


Fig. 8c: Total Mortality Rate 60+ for Other Inf. by Country by Year

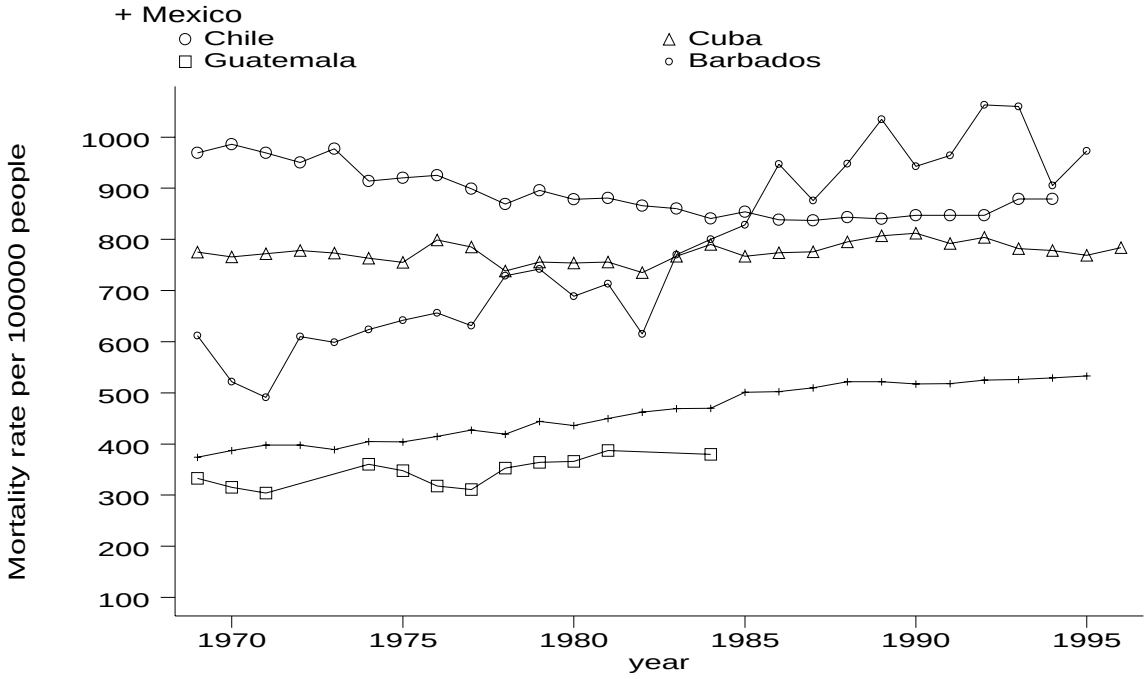


Fig. 8d: Total Mortality Rate 60+ for Neoplsm. by Country by Year

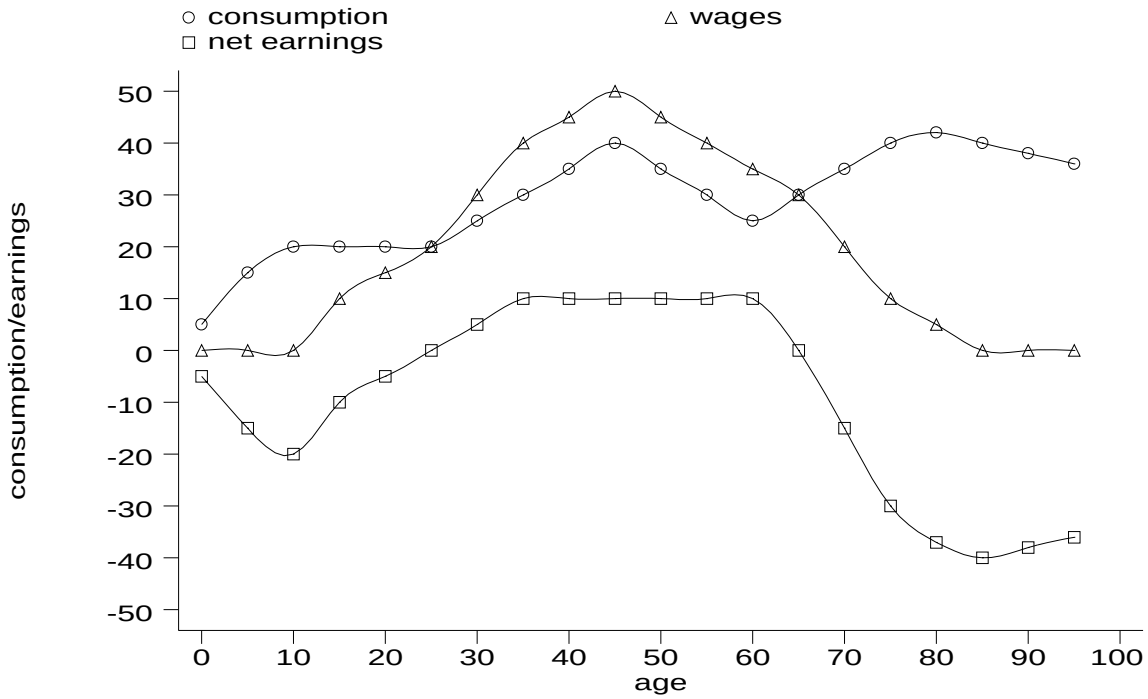


Figure 9: Stylized earnings and consumption functions

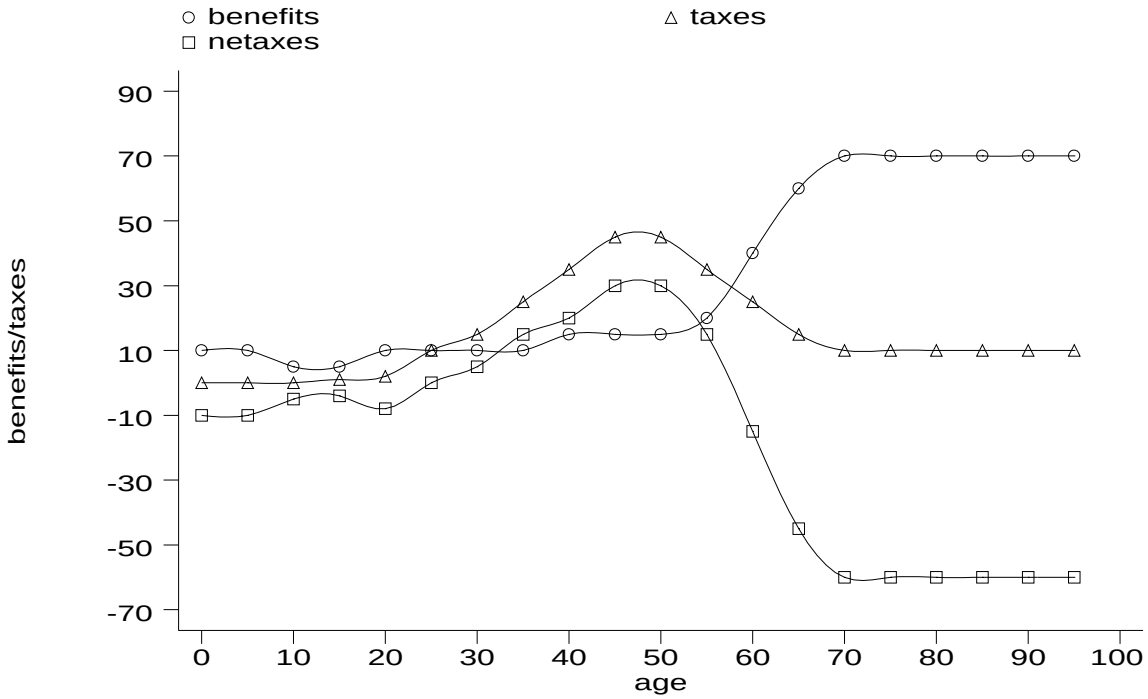


Figure 10: Stylized benefits and tax functions

Center for Demography and Ecology
University of Wisconsin
1180 Observatory Drive Rm. 4412
Madison, WI 53706-1393
U.S.A.
608/262-2182
FAX 608/262-8400
comments to: palloni@ssc.wisc.edu
requests to: cdepubs@ssc.wisc.edu