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How demographic transition forms demographic bonus and aging process in Mexico

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Age-Structural Transitions:
Demographic Bonus, but Emerging Challenges
for Population and Sustainable Development

HOW DEMOGRAPHIC TRANSITION FORMS DEMOGRAPHIC BONUS AND AGING PROCESS IN MEXICO

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Abstract

The demographic transition in developing countries —as in Mexico— elapses faster than in developed countries, the process that has taken more than two centuries in most developed countries, will only take a century in Mexico. The decline of mortality in the country, due in good part to imports at low cost of effective medications discovered in developed nations, and the pronatalist policy, that tried to satisfy the manpower demand from growing industry and to fully inhabit national territory, propitiated the high population growth of Mexico along the XX century. Consequences of that demographic past are evident now, and will be even more evident in the following years, when demographic bonus will offer the opportunity to foment savings and investment to face, only some lustrums later, a fast and profound aging process. In this paper, the demographic origin of those two changes in age structure is revised, mainly focusing on how past and future changes in fertility, mortality and migration contribute to build the demographic bonus and the eventual aging process. On one hand, changes in fertility and mortality contribute positively; on the other hand, international migration diminishes the combined contribution of natural growth at working and dependent ages. Most of population growth at working ages, the self-foundation of demographic bonus, comes high fertility observed up to 1969 and the mortality decline during the 1970-1999 period. From 2000, the contribution of demographic dynamics to the bonus diminishes significantly. The gain originated in 1970-1999 is counterbalanced by net loss during the following thirty-five years. Different policies have been implemented in recent years that can help to take advantage of the demographic bonus, although they have not been designed specifically to face the age structure transition. *Oportunidades* (Opportunities) Program is designed to eradicate extreme poverty and is focused on creating human capital by means of alimentary scholarships conditioned to children and adolescents staying at school. *Arranque Parejo en la Vida* (Fair Life Start) program seeks to offer the same opportunities of healthy survival to all newly born and should also influence positively in the use of demographic bonus.

1. Introduction

In the new millennium, Mexico experiences an intense process of change that implies multiple transitions in the economic, social, political, urban, epidemiological and demographic spheres. The country is advancing in these transitions, although it will take some time to conclude each of them.

The demographic transition is a process that almost all the countries of the world have undergone, and it refers —in general terms— to the transit from a regime with high and uncontrolled rates of mortality and fertility to another with low and controlled rates. As it is well known, this process is far from being uniform, both among countries and within them. The study of patterns and modalities of the demographic transition in a wide variety of countries has shown important differences in the onset, pace, the duration of the process, as well as in the time elapsed from the decline in mortality to the decrease in fertility.

Mexico has advanced significantly in this process of change during the XX century and we anticipate it will conclude in next fifty years. In its final stage, population age structure will experience two changes so marked as dissimilar: first, population at working ages will grow quickly; and second, old people age group will increase in a significant way, reaching similar proportions to those of the developed countries by the middle of current century.

In this paper, the demographic origin of those two changes in age structure is revised, that is to say, how past and future changes in fertility, mortality and migration contribute to build the demographic bonus and the eventual aging. Firstly, I take a look to the stages of demographic transition and later, I analyze the contribution of those three demographic phenomena to changes in the number and age structure of Mexican population.

2. Demographic transition in Mexico

Demographic transition in Mexico has followed the typical profile of the process, as can be seen in figure 1: the first phase, beginning in 1930, is identified as a fast decline of mortality rates, while birth rates remain relatively constant, with an increase between 1945 and 1960. A second phase can be set since 1970, when the descent of fertility was accentuated, although it began during the 60s. The third phase of the process—when birth and death rates converge— will take place during the first half of the XXI Century.

This process is reflected in the intense population growth registered between 1921 and 1970, as well as in its significantly slower rate during the last three decades. It is estimated that the population growth rate rise from 1.4 percent in 1921 to 1.7 percent in 1930, to 2.7 percent in 1950 and to 3.5 percent in 1965. Since that year, as a consequence of fertility decline, demographic growth began to gradually decelerate, registering a rate of 3.1 percent in 1970, 2.3 percent in 1985 and 1.3 percent in 2000 (see figure 2). As it can be seen, after a long period of demographic transformation, Mexican population entered to the new millennium with a growth rate similar to the one observed one hundred years ago, but with a seven times bigger population.

Changes in the demographic variables

A quick and sustained decrease in mortality took place since thirties —in a context of deep economic, political and social reforms. In 1930 life expectancy at birth reached 35.9 years (34.9 for men and 36.9 for women), while in 2000 it was of 74.0 years (71.6 years for men and 76.5 for women). The more impressive increment was in the 1942 to 1960 period when life expectancy increased almost a year (0.95) per a calendar year (see figure 3). The fall in general mortality has been of such a magnitude that the global reduction of risk of death equals 82.1 percent among men and 85.9 percent among women in the 1930-2000 period and 51.3 and 52.9 percent, among males and females respectively, in the 1942-1960 period. As in many other countries, Mexican mortality descended slowly during the decade of the 60s and therefore small earnings in life expectancy. Later, starting with the decade of the 70s, the descent pace recovers its strength, but not so fast as earlier.

The expansion of educational services and sanitary infrastructure are among the main determinant of this strong mortality decline, as well as the spreading of health services, remarkable from the date the Social Security Mexican Institute (IMSS) was created, in 1942, and the transformation of the National Department of Health into Ministry of Health, in 1943.

According to recent population projections (CONAPO, 2002; Partida, 2003), life expectancy would increase from 74.0 years in 2000 (71.5 for men and 76.5 for women) to 76.6 (74.2 and 79.1) in 2010, 79.8 (77.5 and 82.1) in 2030 and 81.3 years (79.0 for men and 83.6 for women) in 2050 (see figure 3), that is to say that mean life in Mexico at the end of the projection horizon will be similar to that observed in Japan recently (77.2 for men and 84.0 for women in 1998), the country that registers the lowest level of mortality in the world nowadays. The foreseen gains in life expectancy could be relatively conservative, since the global reduction of risk of death equals 44 percent between 2000 and 2050, smaller to 73 percent registered in the 1950-2000 period.

Fertility decline did not begin in the country until mid-60s. Levels stayed high and even rose before the onset, making evident the prevailing pronatalist policy in the country in those years. Let us remember that families had around 6 children at the beginning of the XX century, reaching a maximum of 7.2 children during early 60s. The gradual spread of family planning practices, within a new population policy that seeked to regulate the population growth and attending agreements of the United Nations World Population Conference held in Bucharest in 1974, it contributed to impel the fertility transition in the country (see figure 4).

Total fertility rate (TFR) registered an average of six children per woman in 1975; then fell to five children in 1979, four in 1985, three in 1994 until reaching around 2.2 children at present time (see figure 4). As can be seen, the Mexican experience, as well as that of other countries, shows that once the fertility transition begins, the rhythm of decline accelerates rapidly. As fertility reaches lower levels, additional reductions per year are ever lower.

Mexican population policy has the explicit goal of reaching, by 2005, the fertility replacement level (TFR equals to 2.1 children per woman).[1] It is estimated that in 2000 about 70.7 per cent of

[1] The goal was proposed in 1995, when the *National Population Program 1995-2000* was presented. This goal has also being sustained by the *National Population Program 2001-2006*.

married women in reproductive ages used contraceptive methods. In order to reach a replacement level, use of contraceptive methods has to increase to approximately 73.7 per cent, something that requires an annual average increase of almost 0.6 per cent, which is less than 0.9 per cent registered in Mexico in 1997-2000.[2] Hence, the required increase in use of contraceptive methods is feasible. Mexico has a strong and consolidated family planning program that is determined to take care of unmet demand for contraceptive methods.

Keeping in mind the goals on fertility and use of contraceptive methods prevalence, assumed by the Mexican government, and a minimum of 1.85 children per woman suggested by a group of experts convened by United Nations (2002: 18-20), we projected TFR as shown in figure 4, assuming that it would remain constant from 2030 on, at 1.85 children. The below-replacement fertility would propitiate an eventual population's decrease (negative growth rate).

The net loss for international migration has been significant since 1960, as we can see in figure 2. We estimate that territorial mobility —mainly Mexicans to United States— reduces by 0.4 percent the natural growth rate at the present. The forecast for next fifty years points that net emigration rate could decline from 0.39 percent in 2000 to 0.23 percent in 2050. If fertility, mortality and migration rates foreseen for 2050 stayed constant, the intrinsic growth rate of stable population that possibly would be reached, it would be of -0.78 percent.

3. Age structure transition

Different stages of demographic transition are printed in Mexican population age structure, as can be seen in the sequence of age pyramids in figure 5. The conjunction of a descending mortality and a high and upward fertility caused a quick rejuvenation of population between 1930 and 1970. Then, a frank decrease of fertility in the following thirty years propitiated a progressive reduction of the base of the pyramid.

Recent demographic projections indicate that this process will be more noticeable in the next five decades. The contraction of the pyramid will be more and more notorious, not only in relative terms but also even in absolute, while the inertia of the quick growth of the past will become evident first at working ages (15-59) and later, at older ages (60 and over). Population at working ages will almost increase 27 percent from 2000 to 2015, 3.8 percent in the three next quinquenniums and it will diminish 9.5 percent in the last two decades. Senior citizens, on the other hand, will stay continuously growing: 76.3, 83.3 and 63.2 percent, respectively, in the same periods.

Changes in age structure are clearer in the time series for six functional age groups, as can be seen in figure 6. Pool (2004: 11) suggests those groups could represent different life-cycle stages: childhood by 0-14 years, youth by 15-29 years; early middle-age by 30-44 years; late middle-age by 45-59 years; early retirement ages by 60-74 years; and old age by 75 years and over. Trend in childhood proportion is similar to one of crude birth rate (figure 1), which is due

[2] It is estimated that between 1995 and 2000 the TFR declined approximately 0.47 children, corresponding to an annual decrease of 0.09 children. Reaching fertility replacement level in 2005 will imply a slower annual decrease of the TFR (0.06 children) since 2000.

to the fact that those generations are "close" to their birth time. As time goes on, later cohorts have bigger survival proportions because mortality declines, but they are also reduced by the presence of intense international migration since 1960, mainly in young and early middle-ages groups.

Non stable fertility, mortality and migration generate a situation in which the expected "generational parallelism" among the six age groups in the fifteen-year periodicity (high point of age group 0-14 in 1965-1969 it is not located for 15-29 age group in 1980-1974, etc.) cannot be appreciated, neither in displacement of profiles (the pattern of high point of 0-14 age groups spreads when the same cohorts are in the 15-29 and 30-44 age groups), neither in the proportion of total population they represent as time goes by.

These expected regularities are clearer if we take into account the potential demographic growth implicit in age structure or "momentum" of population (Pool, 2004: 9). That is to say, the population increase of each age group with respect to the total population to the beginning of a period, or in other terms, as each age group contributes to the total population growth rate. Trends of momentum year by year are presented in figure 7. Now, not only the periodicity and the profile are completed among the six age groups, but we can also recognize some "waves", although not as marked as those in other countries (Pool, 2004, figure 3).

Different stages of total growth rate are more evident in 0-14 years age group, although they are also perceived in the other groups. The fall in the number of births during the intermediate six-years period (1912-1917) of Mexican Revolution (1910-1921), for example, is noticed smaller fifteen years later (1927-1932) in population aged 15-29, thirty years later (1942-1947) in people age 30-44 and has been almost diluted (1987-1992) when the cohort is aged 75 years and over, due mainly to the increase of survival probability.

A most evident wave is that formed around 1960, direct consequence of earlier promotion and later discouragement to big family. Once declining fertility is slowed since 2005 (figure 4), the convergence process to eventual stable population forms some waves, although of much smaller height to that registered around 1960. Then, these waves will be spaced in fifteen years intervals ("generational" spacing) along the present century, although they will only be perceived in childhood and youth ages until 2050 (figure 7).

Demographic bonus and aging

In the path toward the demographic aging, there will be a period when the most favorable demographic conditions will converge and they would contribute to trigger the potential Mexican economic growth if they are adequate and rationally capitalized. The gradual narrowing of the base of age pyramid and the displacement of most numerous generations (as a result of high growth rates in the past), first toward working ages and later to the peak, opens a favorable scenario to employment, savings and investment that it is characterized by a more advantageous relationship between productive and dependent population groups.

This "opportunity window", also called *demographic bonus or dividend*, will remain transitorily opened up in Mexico, for the first and only time, approximately from 2006 to 2028. The dependency ratio is one of many indicators that allow locating that "opportunity window" along the time. Dependency ratio consists of the sum of number of children and adolescents (0-14) and elders (60 years and over) divided by people at working ages (15-59 years). Dependency ratio is a raw and basic indicator; nevertheless, it allows capturing the transformations in age structure as the demographic transition advances.

In figure 8 the evolution of dependency ratio is presented. It can be observed how during the XX century, the profile of total indicator was almost completely determinated by childhood dependency ratio (sum of children and adolescents aged 0-14 divided by working ages population groups), reflecting the presence of high demographic growth. The differential between a faster reduction in children and adolescents (0-14 years old) originated by fertility declining than that elders taken place by increasing survival proportions, makes the total dependency ratio to stay around a minimum for some years; later, it increases again quickly as a consequence of the aging process, reflected in a raising elderly dependency ratio.

This pattern is recognized clearly in the first half of the current century in figure 8. There isn't a precise value of dependency ratio that allows fixing temporarily to demographic bonus. Here I take the period when dependency ratio is less than 60 percent. In the years of higher demographic growth (1960-1975) and the rejuvenation of age structure, for each a hundred people at labor force ages it had as many as or more additional consumers. Four decades later (2006-2028) it is expected that this proportion has decreased less than a half. Then, if the manpower supply is adequate and rationally capitalized, more than a fourth part of total consumption of 60s and 70s of last century could be transferred to savings and investment in tennies and twenties of current century. It is in this sense that one speaks of demographic bonus or dividend.

Our purpose is to appreciate how changes in each one of the three demographic phenomena — since 1900— have contributed and will contribute to build of demographic bonus and aging. The method is firstly exposed and then the results.

4. Contribution of changes in demographic phenomena to changes in the size and age structure of population.

Method

This method is based on an old demographic principle: population aged x at time t is equal to the number of births happened in t-x plus the history of mortality and migration of that cohort. In this way, the increase in population of a certain age in two moments in time is similar to sum the differences of births and histories of mortality and migration of these two cohorts. Horiuchi (1988) originally presented the result; here I rebuild its formulation.

Let $\mu(x)$ be the instantaneous mortality rate (force of mortality) at exact age x. It is well-known that surviving proportion at age a from birth in the cohort of life table is given by:

$$p(a) = \frac{\ell_a}{\ell_0} = \exp\left\{-\int_0^a \mu(x)\,dx\right\}$$

where ℓ_a are the survivors at age *a* from ℓ_0 births. In a similar way, for a real cohort born at *t-a*, migration aside, surviving proportion is:

$$s(a,t) = \exp\left\{-\int_0^a \mu(x,t-a+x)\,dx\right\}$$

where $\mu(x,t)$ is the instantaneous mortality rate at exact age *x* and time *t*. The negative sign in the exponential of the right side is due to that mortality rate is positive and mortality reduces the size of the cohort. If we want to incorporate the effect of international migration, we must add the net international migration rate $\eta(x,t)$ —positive or negative— in the exponent:

$$s(a,t) = \exp\left\{-\int_0^a \mu(x,t-a+x)\,dx + \int_0^a \eta(x,t-a+x)\,dx\right\} \qquad (1)$$

Let $P(a,t)$ be the annual density of population aged *a* at time *t* y $B(t-a)$ the annual density of births at time *t-a*, clearly:

$$P(a,t) = B(t-a)\; s(a,t)$$

Similar to mortality rate, instantaneous growth rate is the derivative of natural logarithm of population respect to time:

$$r(a,t) = \frac{\partial}{\partial t}\ell n\{P(a,t)\}$$

then:

$$r(a,t) = \frac{\partial}{\partial t}\ell n\{B(t-a)\; s(a,t)\} = r_B(t-a) - \int_0^a \frac{\partial}{\partial t}\mu(x,t-a+x)\,dx + \int_0^a \frac{\partial}{\partial t}\eta(x,t-a+x)\,dx \qquad (2)$$

where $r(a,t)$ is the instantaneous growth rate of population aged *a* at time *t*, $r_B(t)$ is the instantaneous growth rate of births at time *t*:

$$r_B(t) = \frac{\partial}{\partial t}\ell n\{B(t)\}$$

and by (1) the derivative of natural logarithm of $s(a,t)$ respect to time is:

$$\frac{\partial}{\partial t}\ell n\{s(a,t)\} = -\int_0^a \frac{\partial}{\partial t}\mu(x,t-a+x)dx + \int_0^a \frac{\partial}{\partial t}\eta(x,t-a+x)dx$$

If we multiply both sides of (2) by population at moment *t*, we have the absolute increase of population aged *a*:

$$\begin{aligned} \frac{\partial}{\partial t}P(a,t) &= P(a,t)r(a,t) \\ &= P(a,t)r_B(t-a) - P(a,t)\int_0^a \frac{\partial}{\partial t}\mu(x,t-a+x)\,dx + P(a,t)\int_0^a \frac{\partial}{\partial t}\eta(x,t-a+x)\,dx \end{aligned} \qquad (3)$$

It can be recognized the contribution of natality change in first term of right side of the second equation, mortality improvements between cohorts in second term and the effect of net migration changes in third term.

The discrete version of equation (3) is:

$$\begin{aligned} \Delta_t P_a(t) &= P_a(t+1/2)\,r_B(t-a) \\ &\quad - P_a(t+1/2)\sum_{x=0}^{a}\Delta_t M_x(t-a+x) \\ &\quad + P_a(t+1/2)\sum_{x=0}^{a}\Delta_t \mathrm{N}_x(t-a+x) \end{aligned} \qquad (4)$$

where $P_a(t)$ is the population aged *a* at last birthday at time *t*, $M_x(t)$ and $\mathrm{N}_x(t)$ are mortality and net migration rates, respectively, of age *x* at last birthday at the beginning of *t* year, and $r_B(t)$ is the growth rate of births:

$$r_B(t) = \ell n\{B_t / B_{t-1}\}$$

and B_t is the number of births during the year that starts at *t*.

Demographic bonus and aging

Contribution of changes of each demographic phenomenon to build demographic bonus and aging process is clearer if we separate the natality, mortality and migration trends in three periods approximately corresponding to the stages of demographic transition: the phase of fast demographic growth (up to 1969); fertility decline (1970-1999) and convergence of natality and mortality (2000-2050).

In table 1, contribution of each phenomenon to build demographic bonus is decomposed by period. Demographic bonus is located between 2006 and 2028 (figure 8). On one hand, changes in fertility and mortality contribute positively; on the other hand, international migration diminishes by 8.6 percent the combined contribution of natural growth at working ages (1.2 million of 14.5 millions) and by 11.5 percent in dependent ages (924 thousand of 8.0 millions).

Nevertheless, if we distinguish by period of occurrence the scenario is different. During the years of fast mortality decline and high and raising fertility (1900-1969), changes in these components operate positively; and while contribution of mortality remains being positive in the next seventy five years, contribution of natality turns negative as a consequence of fast fertility decline, and it would be even of such a magnitude during first seven lustrums of present the century that exceeds to the joint positive effect of mortality and migration in both age groups.

Shortly, most of population growth at working ages, the self-foundation of demographic bonus, comes from the quick growth observed up to 1969, mostly due to high fertility (10.1 millions) and the mortality declines (6.9 millions) in the three periods, mainly during 1970-1999 (4.5 millions) that represents almost one third of the total increment (12.3 millions). From 2000, the contribution of demographic dynamics to the bonus diminishes significantly .The gain originated in 1970-1999 is counterbalanced by net loss during the following thirty-five years.

Regarding dependent population group the scenario is more clear because, while reduction from the last three decades of the XX century was originated by international migration —mainly from elders when they were at working ages—, that of the new century will come from below-replacement fertility starting in 2006.

The aging process of Mexican population started some years ago and will significantly accelerate in present century. In 2000, people age 60 years and over represented 4.6 percent of total population and it is expected they will be 21.7 percent in 2050, as it can be seen in table 2. According to the 2000 revision of estimates and projections of the United Nations Population Division, aging proportion for the most developed regions in the world would have increased from 11.7 percent in 1950 to 28.7 percent in 2050. Therefore, the process that has taken more than one century in most developed countries, will take less than half of century in Mexico.

Contribution of natality and mortality to growth of older people is positive in the three phases of demographic transition; even high fertility of the past (1890-1969) contributes with 81.1 percent (18.4 million of 22.7 millions) to expected increase from 2000 to 2050 (23.4 millions). Respect population aged 0-59, on the other hand, the reduction of 18.4 millions due to the below-replacement fertility in most of the next fifty years (2000-2050) will counterbalance the increase (15.0 millions) that was formed in eighty years (1890-1969) of high and rising fertility.

Although the overall reduction of the risk of death is the same (74 percent) for the two eighty-years intervals (1890-1969 and 1970-2050), contribution to increment in both age groups from increasing surviving proportions is notably bigger in the second period (6.6 millions for elders and 11.0 millions for people aged 0-59) that in the first one (5.1 millions and 2.3 millions, respectively).

Thus, current aging process is founded in the high fertility of the past; however, the reduction of mortality and the incidence of international migration will dictate the rule in the distant future, mainly beyond 2050.

Momentum

The inertia of high demographic growth observed until 1970 is still present in age structure and will continue for many years. This is clearly noticed in the contribution of demographic variables to the potential growth (momentum) from 2000 to 2015, as can be seen in table 3.

The joint effect of declining mortality and high and rising fertility (1890-1969) will promote an increment of 16.3 millions, which will be slightly reduced to 15.8 millions for observed and expected demographic dynamics in the next sixty years (1970-2015). The impulse from generations born before 1970 will rise 6.2 percent Mexican population between 2000 and 2015 —at an average of 1.1 annual percent— one half debt to late middle-age people (8.1 percent).

The momentum comes from natality of adults ages 30 and over (15.7 millions) equals to foreseen total growth from 2000 to 2015 (15.8 millions). It can be appreciated that the impulse from decline of mortality (8.6 millions) will only be enough to mitigate the loss from decrease of fertility from childhood and youth (7.0 millions) and from international migration (1.5 millions). In the same sense, the high growth of the past will promote an increase of population of 15.3 percent —at an average of one annual percent— from 2000 to 2015; while the contribution of 8.5 percent from mortality will be nullified by the discount from declining and below-replacement fertility (7.0 percent) and from the massive Mexican emigration to United States (1.5 percent).

Therefore, expected growth for the first three lustrums of present century can be assimilated almost totally to natality in the first seventy years of the last century, as if other demographic dynamics wouldn't have occurred.

5. Impact of international migration

In a different way to that of most of countries, where modifications in the size and age structure of population only depend on natality and mortality, in Mexico international migration has also been decisive in the demographic change.

Mexican migration to the United States is a complex phenomenon, started in the second half of the XIX century and it has structural roots in both sides of the border. Some sectors of American society thought that causes of migration come primarily from South of the border; Mexican people generally thought that migration responds to the interaction of factors of economic, social, cultural and demographic nature that operate in both countries.

Different factors have contributed to support and reproduce this phenomenon for several

decades. We can highlight the following ones: Mexican economy has not been able to absorb the whole supply of national labor force and higher wages in the United States than in Mexico have become a more and more powerful attractiveness factor for Mexican emigrants; diverse regions in the United States —mainly California and Texas—demand Mexican manpower for agriculture, industry and services; there is a emigrating tradition in diverse regions of Mexico; complex social and family networks link the origin and destination places and facilitates the experience of Mexican people in the United States, allowing migration to be intense and with great strength nowadays.

Mexican migration to the United States during 60s and 70s of last century, after the end of *Bracero Program*,[3] can be characterized mainly as a circular flow, composed by adult and young people from rural areas that went into United States to work temporarily in agriculture and return to their origin places after six to eight months. Many of them were from a relatively reduced group of rural communities located in seven or eight states of Mexico.

Now, the profile is completely different. Agriculture is no longer the main occupation in Mexico neither in the United States; its geographical origin has extended to other states of Mexico and even to large cities; the staying period of temporary migrants in the United States —mainly unauthorized— is increasing constantly, and even many people that begin as temporary migrant finish being definitive residents in the United States.

The effect of international migration since 1960 in age structure at 2000 is shown in the contrasted age pyramids in figure 9. The period election attends to the fact that, from that date on, international emigration has been of an important significance to explain the whole Mexican population dynamics (see Figure 2).

Net loss for international migration since 1960 represented a reduction of 17.3 millions in total population (from 117.9 to 100.6 millions); 10.0 millions directly debt to displacement and the remaining 7.3 millions to natural growth of emigrants in another countries.[4] The international migration of Mexico slightly rejuvenates the age structure (an increase of 0.67 percent in the participation of 0-14 years age group in 2000).

The international migration impact is clearer in the propensity to the growth (momentum) in the 1995-2000 period, as can be seen in table 4. Total increment falls in a third part (from 10.7 millions to 7.0 millions), and childhood and youth decrease is practically canceled (from 435 thousand to 11 thousand). Total difference of 3.8 millions is double than net loss of 1.9 millions growth during the 1995-2000 period, which means that half of the difference is due to international migration occurred in the quinquennium and the other half to cumulative effect from seven previous lustrums. Spatial displacement also diminishes in 2.6 percentage points (from 10.0 to 7.4 percent) the natural increase growth rate in the same period. Due, on the one hand, to descending fertility remains high during an important share of the forty years period, and, on the other hand, because young and late middle age people are more inclined to migrate,

[3] *Bracero Program*, ended in 1964, allowed temporary Mexican agricultural workers to participated in American economy in a ordered fashion.

[4] 98 percent of the Mexican born population living aboard, reside in the United States. So, observations refer mainly to this displacement.

the difference in growth rate mainly concentrates in population aged 0-44 (85 percent or 2.20 of 2.58).

Cumulative migration from 1960 to 2000 had also a straight effect in natality. Momentum in reproductive ages population, during the period 1995-2000, was reduced by 2.5 millions: people aged 15-44 increased 4.4 millions instead of 7.0 millions, migration aside, or 7.2 millions were born instead of 7.8 millions during the same period. Long-term international migration effects can also be seen in two facts. First, slower growth of reproductive ages population anticipated the beginning of the number of births fall by a decade (from 1993 to 1983). Second, natality contribution, that of the 1970-1999 period, to demographic bonus (Table 1) and aging process (Table 2) would have been positive instead of negative.[5] So, the global impact of international migration in the demographic dynamics of Mexico, mainly in natality, has been twice as much that sole spatial displacement.

6. Conclusions

The demographic transition in developing countries —as in Mexico— elapses faster than in developed countries. Fast changes in the size and age structure of population imply challenges that not always are solved or their solution require a lot of time. The decline of mortality in the country, due in good part to imports at low cost of effective medications discovered in developed nations, and the pronatalist policy, that tried to satisfy the manpower demand from growing industry and to fully inhabit national territory, propitiated the high population growth of Mexico along the XX century.

Consequences of that demographic past are evident now, and will be even more evident in the following years, when demographic bonus will offer the opportunity to foment savings and investment to face, only some lustrums later, a fast and profound aging process.

Different policies have been implemented in recent years that can help to take advantage of the demographic bonus, although they have not been designed specifically to face the age structure transition. *Oportunidades* (Opportunities) Program is designed to eradicate extreme poverty and is focused on creating human capital by means of alimentary scholarships conditioned to children and adolescents staying at school. Although the program has been evaluated successfully, it will be in the first years of demographic bonus when we will be able to verify if available manpower is sufficiently qualified to be fully capitalized to generate savings and investment.

Arranque Parejo en la Vida (Fair Life Start) is another program that should also influence positively in the use of demographic bonus. This program seeks to offer the same opportunities of healthy survival to all newly born, as well as significantly diminish maternal mortality. Foreseen increments for life expectancy and, therefore, population aging depends mainly on the success of health programs as Arranque Parejo en la Vida.

[5] The sum of growth rates of births, in first term of right side of equation (4), equals -0.022; without migration equals 0.105.

Oportunidades and Arranque Parejo en la Vida programs are short and medium term targeted and they are useful tools for a good use of demographic bonus. The major challenge is to generate enough productive and well-remunerated employments to allow the complete use of growing manpower supply due to fast growth of population at working ages.

Informal employment is almost 40 percent of economically active population now. It will be also necessary to create enough employment to satisfy the annual increment of more 900 thousand people in the labor force from 2004 to 2011, at an average of 700 thousand during the 2012-2023 period. As "opportunity window" remains open, labor force will increase 16.7 millions, and 15.7 millions of them are concentrated in the 15-59 years age group. The appropriate use of demographic bonus relays in the real possibilities of minimizing the informal sector of economy and of creating productive employment for new plaintiffs. Only in that way, savings and investment opportunities offered by a favorable dependency ratio can be optimally capitalized.

If the current stagnation of the Mexican economy lengthens ten or fifteen years, demographic bonus will become a true demographic nightmare, "opportunity window" will close without having been exploited while it was open and, the worst at all, Mexico will be condemned to become an old and poor country.

References

Collver, A. (1965), *Births rates in Latin America: New estimates of historical trends and fluctations.* University of California, Berkeley.

CONAPO (2002), *Proyecciones de la población de México 2000-2050. National* (Population projections of Mexico 2000-2050. National level), Consejo Nacional de Poblacion, Mexico (in Spanish).

Horiuchi, S. (1988), "Assesing effects of mortality reduction on population aging: An analysis of the elderly female population in Japan". Paper presented at Seminar on *Mortality Transition in East Asia and South Asia*, Beijing, 29 August – 2 September 1988.

Partida, V. (2003), *Proyecciones de la población de México, de las entidades federativas, de los muncipios y localidades, 2000-2050 (Documento Metodológico)* (Population projections of Mexico, states, municipalities and towns, 2000-2050 (Methodological Document), Consejo Nacional de Poblacion, Mexico (in Spanish).

Pool, I. (2004), "Of demographic dividends, windows of opportunity and development: Age-structure, population waves and cohort flows". Paper presented at Seminar on *Age-structural transitions: Demographic bonus, but emerging challenges for population and sustainable development*, CICRED, Paris, 23 to 26 February 2004

United Nations (2002), Completing the fertility transition. New York (ESA/P/WP.172)

Zavala, M.E. (1989), “Dos momentos en la transición demográfica” (Two moments in demographic transition), *Demos*, Mexico (in Spanish): 6-7.