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Papeles de Población,

Demographic dividens and the economy of the vital cycle in Costa Rica[*]

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Resumen

Se identifican dos dividendos o bonos demográficos derivados del cambio en la estructura por edades de la población y del perfil del ciclo vital de los costarricenses. El primer dividendo proviene del aumento más rápido de los productores en comparación con los consumidores. El segundo proviene del ahorro y acumulación de activos de los adultos para atender sus necesidades de consumo en una vejez cada vez más prolongada. Casi todo el magro crecimiento económico del país del último cuarto de siglo podría deberse al primer dividendo. El segundo dividendo puede dar a Costa Rica un piso de 0.5 por ciento anual de crecimiento económico como mínimo. Se identifican dos peculiaridades del ciclo vital en Costa Rica: elevadas transferencias públicas hacia los adultos mayores y un flujo de transferencias intergeneracionales que se invierte a partir de los 75 años de edad.

Palabras clave: adulto mayor, ciclo vital, dividendo demográfico, envejecimiento demográfico, Costa Rica.

Abstract

Demographic dividends and vital cycle economics in Costa Rica

There are two identified dividends or demographic bonuses derived from the Costa Rica's change of population's age structure and vital cycle's profile. The first dividend comes from the saving and actives' accumulation of the adults to support their consumption needs in an old age, now commonly long. Almost all of the country's meager economic growth in the last twenty-five years could be caused by the first dividend. The second dividend can provide Costa Rica with a base of an annual 0.5 percent of economic growth, at least. There are two identified peculiarities in the Costa Rica's vital cycle: high public transfers towards the elderly and an intergenerational transfers' flow inverted as from the 75 years of age.

Key words: elderly people, vital cycle, demographic dividend, demographic aging, Costa Rica.

Introduction

In an individual's life cycle there is a time to grow and to prepare, another to produce and reproduce and, in modern societies, a third time to harvest the fruits of a life of labor. The profiles by age of production curves (income from labor) and consumption of graph 1 (section A, upper part) eloquently show
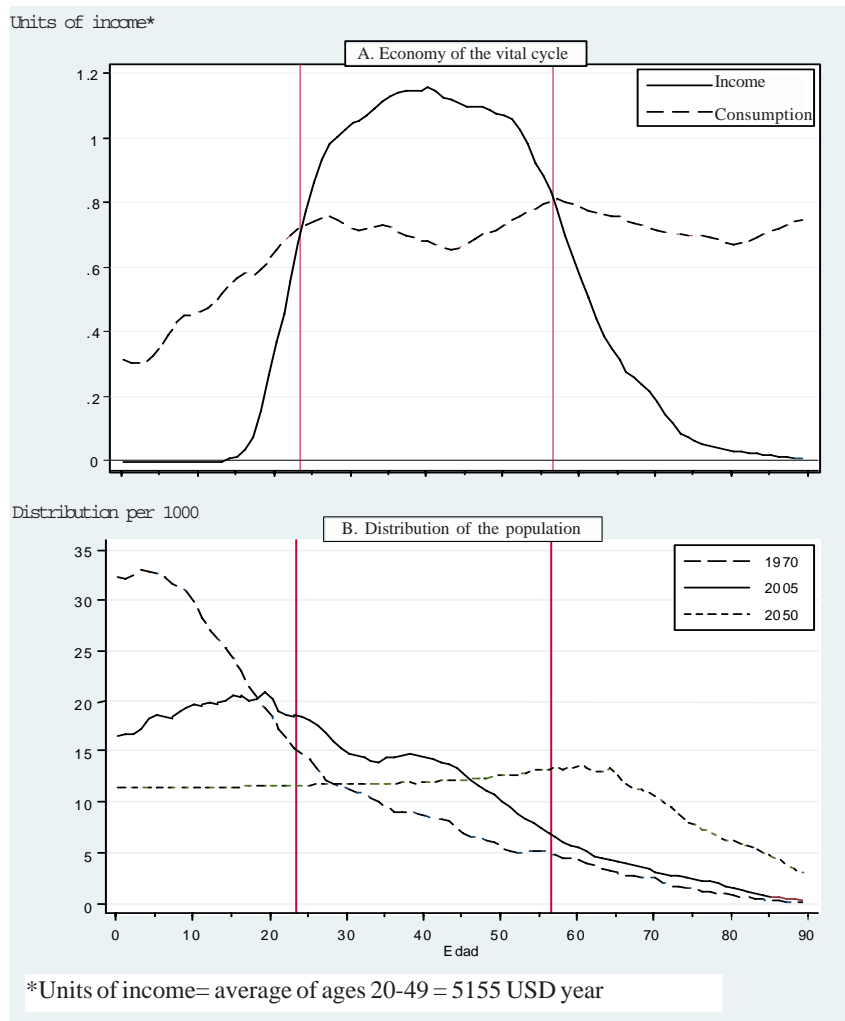
these three stages of the vital cycle in Costa Rica in 2004, with data from the National Survey on Incomes and Expenditures of the Households (*Encuesta Nacional de Ingresos y Gastos de los Hogares, Enigh*) (INEC, 2006). That which is produced by an average Costa Rican, between 24 and 57 years of age, surpasses what he or she produces; there is an excess; before and after said ages the opposite occurs: a deficit of the produced in respect to that consumed. This deficit in youths and the elderly is afforded by means of transferences from the surpluses of the central ages. The transfers might take place in the core of the families or with the State as an intermediary, yet also as reallocations within the same cohort through savings or differed consumption from the surplus ages towards the deficit ages. The transferences to the youths largely occur in the familial core. The vehicle of transferences to the elderly may substantially differ between societies (Lee *et al.*, 2003).

The numerical balance of people in a population varies along these three vital stages; in one end there is the stage of extravagance of life that prevailed in almost the entire human history, which is reproduction in large numbers so as to compensate for the high mortality rate. In this regime, life becomes meaningless once reproduction is concluded, and the structure by ages of the population is overly young: the individuals in the first stage of life are majority. Still few decades ago, nearly half of the population of the developing countries was below 15 years of age and less than 5 percent was population above 65 years of age. In the other end there is the stage of the economy of life, where mortality is minimal and so is natality, which turns out to be demographic aging and the protagonism of the third stage of the vital cycle. Adults older than 65 years of age reach the fourth part of the population in this post-transitional demographic regime.

This substantial demographic change in the distribution by ages of the population is illustrated for Costa Rica in graph 1 part B (INEC and CCP, 2002). In 2005, the country is in the middle of the transition between the extremely young demographic age of some decades ago and the aged structure that it will probably have in 2050. Some other developing countries are in a similar situation. This dramatic change in the structure by ages of the population has caused the diminution of the weight or pondering of the deficit of young ages, in favor of a heavier weight of the productive ages. The increment in advanced ages has been thus far modest, however it will increase in decades to come. What is more, within the productive ages, young adults will lose importance.

GRAPH 1

PROFILES BY AGE OF THE LABOR INCOME, PER CAPITA CONSUMPTION
AND DISTRIBUTION OF POPULATION; COSTA RICA, 2004

Units of income*

A. Economy of the vital cycle

| | Income |
| | Consumption |

Distribution per 1000

B. Distribution of the population

	1970
	2005
	2050

Edad

*Units of income= average of ages 20-49 = 5155 USD year

Source: own elaboration based on data from the 2004-2005 National Survey on Incomes and Household Expenditures and the National Institute of Statistics and Censuses of Costa Rica.

The diminution of birthrate has made that in Costa Rica —and in other developing countries— the problem of the rapid growth of the population and its consequences lose validity; the central preoccupation of the studies started by Maltus, more than 200 years ago, and which became relevant in the second half of the XX century. Instead, the study of the consequences of the changes in the structure by ages of the population generated by demographic transition and in particular because of the rapid fall in birthrate has been favored.

The pioneering study by Coale and Hoover (1958) underscored at that time the changes in the structure by ages of the population as the key mechanism by means of which the reduction of demographic growth influences on the economic growth, mostly due to the deepening of the capital by worker and the consequential increment in productivity. In the 1990's decade, the economists of the World Bank rediscovered the importance of the structure by ages and draw attention to the 'demographic dividend' or 'bonus' as a factor in the take-off of the western Asian economies. On the basis of econometric models they conclude that a third of the growth of the per capita income in said economies may be due to the demographic dividend (Bloom and Williamson, 1998). The seminal work by Ronald Lee (1994) formalizes in mathematical models the economy of intra- and inter-generational transferences of the individual life cycle. Mason and collaborators (1999) are based on these models to estimate as 25 percent the demographic dividend in the economies of west Asia.

Closer to present day, Mason and Lee (2006) postulate the existence of a second demographic dividend originated in demographic aging and the accumulation of wealth and capital the adults carry out in views of their consumption needs in old age. This increment in capital would allow increasing the productivity of laborers and consequentially accelerate the growth of economy.

The present article has as a central objective to estimate the potential effect of these two demographic bonuses in the economy of Costa Rica. In order to reach this objective, the study must determine the economy of the vital cycle in Costa Rica before, namely: the profile by ages of income from labor as well as consumption, the magnitude and the forms of resignation of resources in the vital cycle to cover the deficits of consumption in young and old ages. The combination of the profiles by age of the economy of the vital cycle with data from the population by age allows estimating the magnitude and trends of the demographic dividends. This information at the time allows going beyond simplistic notions that see demographic aging as only a treat, and rather provide the opportunity to evaluate the economic opportunities from the change of the structure by ages.

The history of Costa Rican population is typical for a Latin American country, nonetheless slightly accelerated and advanced. By 1960, the country had one of the highest demographic vegetative growths in the world, close to four percent annually, product of a relatively low mortality and an exceptionally high fertility. Back then, a sharp decrease in fertility takes place, changing from 7.3 children per woman to 3.8 in 1975; after a rest of a decade, the decrease continues and in 2001 the country reaches replacement fertility, being second only after Cuba in Latin America to reach it. At the same time, life expectancy (81.4 years in women and 76.9 in men, in 2005) is one of the highest in the continent, even above the U.S. (CCP, 2006; PRB, 2006). In spite of the speed of these demographic changes and the noticeable modifications in the structure by age they imply, the announced aging of population has just begun, yet it will take swing in the first half of the XXI century. The population of 60 years will explode from 300 thousand in the 2000 census to circa two million in 2060, with a weight over the total population of 7.6 percent in the first year (no so different from the 6 percent in 1960) and 30.6 percent in the second year (INEC and CCP, 2002).

Data and methods

The profiles by age of the economy of the vital cycle are estimated with data from the National Survey on Income and Expenditures of the Households (Enigh) for 2004-2005. The National Institute of Statistics and Censuses (*Instituto Nacional de Estadística y Censos, INEC*) provided original databases for individuals and households between March 2004 and April 2005 in a national sample of 4200 households and 15600 people. Because of briefness, we will refer to this survey as that of 2004. We modified the factors of sampling weighing so that they reproduce the estimations of population by simple age at the mid 2004 (INEC and CCP). We adjusted the national aggregated obtained from the survey to those of the national accounts for 2004, published by the Central Bank of Costa Rica in its web page. Additional data for income and public expenditure were obtained from the web page of the Technical Secretariat of the Budgetary Authority of the Ministry of Treasury (*Secretaría Técnica de la Autoridad Presupuestaria del Ministerio de Hacienda*), as well as from the Costa Rican Fund of Social Security (*Caja Costarricense de Seguro Social, CCSS*) as for the mean cost per student of the different educational levels.

The estimation was replicated with data from 1987-1988 Enigh, with central year: 1988; households: 3900; people: 18200; databases provided by INEC. All the population data by simple ages are from the estimations and projections of INEC-CCP.[1]

For comparative ends estimations of the accounts of the vital cycle for U.S., year 2000 are also used; they are available at the web site of the multinational project *National Transfer Accounts* (NTA).[2]

The methodology to estimate the accounts of the vital cycle is sketched in (Mason *et al.*, 2005) and described in detail in the electronic sites of the aforementioned NTA project.

The specificities of the estimation in Costa Rica are as follows: labor income includes gross wages, social loads paid by the employers, the contributions of the workers to CCSS, the Fund of Social Development and Familial Assignations (*Fondo de Desarrollo Social y Asignaciones Familiares, Fodesaf*), the Mixed Institute of Social Aid (*Instituto Mixto de Ayuda Social, IMAS*), and the National Institute of Learning (*Instituto Nacional de Aprendizaje, INA*). It also includes direct taxes (revenues and property) and indirect taxes (importation, mainly), except those of sales and consumption that, it is supposed, are paid by the consumer (the heads of family transfer funds to afford the consumption of their children, who at the time transfer to the government the tax on sales and consumption).

Transfers to governments include indirect taxes (sales, consumption and importations, mainly), tax on the payroll, consisting of the contributions from employers and workers which are discounted from the wages (excluding those that go to the individual fund of labor capitalization and complementary pension) and the rest of direct taxes (revenues and property). The transfers from the government include: consume of education and public health (estimated with information from the uses and costs of the services), general services (distributed among the population) and cash transfers from pensions of the different regimes.

In the estimation of private transfers the methodology of the NTA project was faithfully followed. The transfers between households (concentrated in the head of family) and intra-households were estimated. The re-assignations among the same cohort were also estimated, by means of the valuing of the income from actives including owned household. The transfers from abroad, or remittances, to the households are considered as a separate category.

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[1] Available at: http://censos.ccp.ucr.ac.cr/.
[2] Source: http://www.schemearts.com/proj/nta/web/nta/show.

The wealth, or actives, of the people or households were impossible to be determined directly. Only the income from them is calculated. Net savings were obtained in a residual manner.

The profiles by ages are estimated until a final open group of 90 years of age and older. The number of individuals in this final group in both Enigh was only 24 in 1988 and 52 in 2004, which keeps from reaching older ages.

Legacies and inheritances are estimated in two groups, from the mortality rates by simple ages of the 1987-1989 and 2003-2005 triennia corresponding to each Enigh.[3] For those who live in pluri-personal houses, the wealth of the deceased was proportionally distributed among the survival members of the household. For those who live in unipersonal houses, the inheritance of the deceased was assigned to the cohort 27 years younger (this is the mean age of fertility in Costa Rica). The wealth of the individual was estimated from the value of the income from actives, assuming a rate of return of 6 percent a year. It is also assumed that all the wealth of the household is concentrated on the head of family.

An exchange rate of 450 Costa Rican Colon (CRC) per American dollar (USD) was used in order to convert the 2004 CRC to this value and facilitate the comparisons. In the estimations with Enigh in 1988, an index of prices of 9075 between 1988 and 2004 and an exchange rate of C/450, to obtain estimations in 2004 dollars. Besides, to facilitate the comparisons of the profile by ages (and not to leave aside the absolute levels of the curves) the results are presented in terms of «units of income», consisting of the simple average labor income at the ages from 20 to 49 years of age. In Costa Rica, this unit is 3400 USD in 1988 and 5200 USD in 2004, whereas in U.S., year 2000, it is 35400 USD (no corrections by acquisition power of these incomes are made).

The first demographic divided comes from the variation in the quotient of sustenance (labor income per actual consumer). This equals the difference in the rates of growth of the actual labor income subtracting actual consumption. The dividend comes from the relative increment of people in ages with a surplus of production on consumption. A way to see this dividend is how the rate in which the income per actual consumer would increase if the productivity by laborer remained constant and the only changes were those of the structure by ages of the population.

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[3] Source: INEC, vital statistics, web site: http://censos.ccp.ucr.ac.cr/

The first dividend produces benefits for the households (in addition to the recipient of income per household) and for the government (broadening of the taxpayer base relative to those of public transfers' recipients). Consequently, we have estimated a familial dividend and another fiscal, as components of the general dividend. The demographic dividend is estimated, according to Lee and Edwards (2001) as the variation rate of the quotient of fiscal sustenance (actual taxpayers per actual governmental transfer recipients) or, in short, the difference in growth rate of the actual taxpayers and the recipients of transfers (i.e., pondered populations by per capita transfers). The familial demographic dividend is estimated with the variation rate of the quotient of familial sustenance (recipient of actual incomes per actual recipients of inter-living transfers), this is, the difference in growth rate of actual labor income subtracting that of the actual inter vivos transfers received.

The second demographic dividend comes from the increment in the capital per laborer which is the result from the accumulation of wealth in views of the consumption needs in advanced ages and the fall in labor incomes. Mason and Lee (2006) propose to estimate this dividend with the rate of change of the wealth necessary to cover the difference between the current values of consumption and future labor income, which implies complex actuarial calculations within a horizon of many a future decades and suppositions about the discount rate in order to obtain present values. In this article we employed a more simple approach to estimate this dividend: the difference in the wealth's growth rate subtracting the growth rate of the actual laborers. At the time, supposing the saving rate and capital performance constant, the wealth's growth rate is estimated by the growth rate of the income from actives. The second dividend is originated, then, in the 'deepening' of the capital per laborer caused by the savings of the growing number of elderly people. Following Mason and Lee (2006) we assume a capital/product elasticity of 0.5, this is to say, an increment of one percent in the capital per laborer will increase the product in 0.5 percent. The dividend estimated in this article should be taken as a least value, since it does not take into account the increment in personal savings that is expectable from foreseeing a longer life, an economic calculation which is indeed accounted for in the estimations by Mason and Lee (2006).

Results

Economy of the vital cycle

Graph 1 shows the profiles by age of consumption and per-capita production estimated for Costa Rica in 2004. As it was pointed out in the introduction, Costa Ricans, from 24 to 57 years of age, generate a surplus: they produce more than they consume on average, with a peak circa 40 years of age. This period of ages with surplus is brief: 33 years. Before 24 and after 57 years of age there is a deficit in the vital cycle (DCV), which covered by transfers and re-assignations, intra- and inter-generational, from the ages with surpluses.
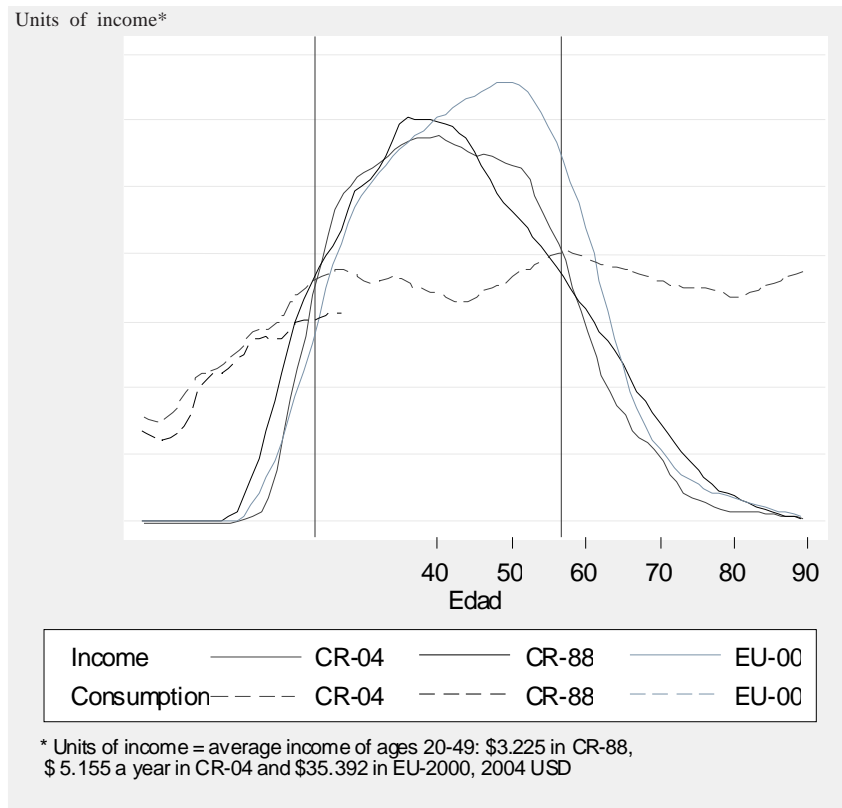
The individuals' consumption is approximately doubled from the first year of life to 25 years of age; from here it remains rather constant. A slight diminution between 25 and 45 years of age might be due to affects of generation rather than age. More specifically, they may be the effect of the acute depression around the 1980's that mainly affected the youths back then. In advanced ages, public and private consumption keeps the consumption curve from decreasing as a result of the more austere lives of the elderly.

The most important component of consumption is "other private consumption" that includes food, clothing, housing, transport, leisure and similar entries. In this is included the locative value from living and an owned household, which by the way, represents four percent of this consumption.

To which extent these curves are similar to those of years ago or those of a developed country (and eventually to a moment in the future)? Graph 2 compares the curves of 2004 with those of 1988 and with those of the US in 2000; the similarities are more striking than the differences. The greatest change in the Costa Rican curves is the increment in relative consumption.

Let us notice that the curves were normalized to income units proper to each population and year, these units substantially increased in Costa Rica from 3400 to 5200 USD per capita between 1988 and 2004, this is to say there was a considerable increment of the absolute income and consumption. However, the graph shows that there was also a relative increment in consumption; i.e., people now spend a greater portion of their incomes, save some ages, this might be a cohort effect (e.g., the age of 45, who were 21 in 1980 and, therefore, entered the labor market during the crisis of the 1980's).

GRAPH 2
PROFILE BY AGE OF THE INCOME AND PER CAPITA CONSUMPTION:
COSTA RICA, 1988, 2004; AND UNITED STATES, 2000

Units of income*

| Income | CR-04 | CR-88 | EU-00 |
| Consumption | CR-04 | CR-88 | EU-00 |

* Units of income = average income of ages 20-49: $3.225 in CR-88,
$ 5.155 a year in CR-04 and $35.392 in EU-2000, 2004 USD

Source: own elaboration based on data from the 2004-2005 National Survey on Income and Expenditures of the Householdsand the National Institute of Censuses of Costa Rica, and National Transfer Accounts (NTA).

The curve of relative consumption of the United States is the highest of the three, especially at school ages (5 to 20 years) and at advanced ages. This is to say, U.S. society transfers relatively more resources than Costa Rica to education and the elderly (possibly health). It is expectable that in the future the consumption curve of Costa Rica increases even more and modifies its profile to resemble more to that of the United Stated.

The curve of labor income, which shows the relative production of the individuals at different ages, falls in Costa Rica from 1988 to 2004 at the end of the productive ages, probable consequence of increments in the coverage of education and social security. The curve of the United States is displaced rightwards in respect to that of Costa Rica. It is, the Americans incorporate later to labor, yet they are productive until older ages and the peak of their incomes is reached at 55 years of age, in comparison to 40 in Costa Rica. A Costa Rican of 55 years of age is substantially less productive in relative terms, than an American at the same age.

The difference between consumption and income curves is the deficit of the vital cycle (DCV). In Costa Rica, DCV exists until circa 23 years of age and reappears after 57 years of age, and there is no deficit between said ages. In balance, the deficit tends to be zero for the whole population. As we said, the deficit is financed with private or public transfers between individuals and with re-assignations between the different ages of the individual. Table 1 summarizes the results by large age groups.

DCV among those under twenty years of age is humongous: 3700 million USD or near a third of all of the labor incomes. This deficit is fundamentally financed (70 percent) with private transferences in the core of the households. The central group of ages from 30 to 49 years of age has a surplus (negative DCV) of almost 2500 million USD, which are mainly financed by private transfers (2000 million USD). The net fiscal load (taxes subtracting benefits) in these ages (1200 million USD) represents 19 percent of the labor income.

The results obtained for the adults older than 65 years of age are of great interest, given that the population's aging is taking place in the country. As expectable, there exists a considerable DCV of 723 million USD, yet it is a fraction (19 percent) comparing with that of the youths. This deficit is mainly covered with public transfers worth 520 million USD. Net incomes are high and even there are substantial net savings. It is worthy mentioning that 13 percent of the incomes from actives corresponds to the locative value of living in an owned household. The most notable result is, nevertheless, that the elderly as a group

TABLE 1
SUMMARY OF THE ECONOMY OF THE VITAL CYCLE BY LARGE AGE GROUPS
COSTA RICA 2004, IN MILLION USD.

Account	Total	< 20	20-29	30-49	50-64	65 and older
Population in thousands	4 249	1 669	1 376	539	423	240
Deficit of the vital cycle	1 772	3 703	-108	-2 490	-57	723
Total consumption	13 587	3 962	2 803	4 226	1 703	893
Private	11 029	2 727	2 412	3 701	1 477	712
Public	2 558	1 235	391	525	226	181
Labor income	11 816	259	2 911	6 716	1 759	170
Resignations	1 772	3 703	-108	-2 490	-57	723
Resignation of actives	1 611	71	0	760	448	332
Net income from actives	3 397	17	325	1 561	947	547
subtract: net savings	1 787	-54	325	802	499	215
Transferences	161	3 633	-109	-3 250	-505	391
Public	-41	1 010	-337	-1 245	20	510
Private	202	2 622	228	-2 005	-525	-119
Inter vivos	202	2 577	187	-2 032	-548	17
Legacies	0	45	41	27	23	-136

Source: own elaboration based on data from the 2004-2005 National Survey on Incomes and Household Expenditures and the National Institute of Statistics and Censuses of Costa Rica.

almost do not receive net transfers from the younger, as these are only 17 million. If the legacies are considered, which are to be considered in this age group (-136 million), inter-generational transfers are rather downwards.

The interesting results obtained for the elderly are compared in table 2 with other societies for which there are available data: Taiwan in 1998 and the United States in 2000. The table shows the financing of consumption (in percentages) of the elderly people. Costa Rica is definitely the champion of public transfers toward the elderly, who represent 58 percent of the consumption. In comparison, they represent 29 percent in Taiwan and 37 percent in the United States. The elderly people in Costa Rica are also distinguished by receiving almost no net inter-vivos private transfers (two percent of consumption). In Taiwan, the family finances 39 percent of the consumption of aged people, and in U.S. seven percent.

TABLE 2

FINANCING OF THE CONSUMPTION OF THE ELDERLY ABOVE 65.
COSTA RICA, 2004; TAIWAN, 1998, AND UNITED STATES, 2000
(IN PERCENTAGE)

Financing of consumption	Costa Rica 2004	Taiwan 1998	United States 2000
Total	100	100	100
Labor	19	12	15
Resignation of actives	37	31	55
Public transfers	57	29	37
Inter vivos transfers	2	39	7
Legacies	-15	-12	-15

Source: own elaboration based on data from the 2004-2005 National Survey on Income and Expenditures of the Householdsand the National Institute of Censuses of Costa Rica, and National Transfer Accounts (NTA).

As it has been indicated, there are three mechanisms to cover DCV: a) private transfers (mainly inter vivos); b) public transfers; and c) the re-assignation of resources in the same cohort by means of savings and acquiring actives before retirement so that said actives generate incomes in older ages. Each age receives and provides transfers. The difference between that received and that provided is a net transfer: positive when that which an age receives is more than that which it provides and negative when an age subsidizes others. In the case of public transfers, the productive ages pay taxes more than what they receive from the State in services or direct payments, whereas the extreme ages pay very little or nothing as taxes and receive much more in monetary public transfers (mainly pensions) or in gift (education, health, security, justice and others). Graph 3 shows the profiles by ages of these mechanisms of net transfers of reallocation of resources. This graph compares the estimated profile for Costa Rica 2004 with that of 1988 and that of the U.S. This is to say, a trend to reach the profiles of the U.S.

The pattern of inter vivos transfers (part A of graph 3) is similar in Costa Rica and U.S., especially up to circa 40 years of age. As from this age, Costa Ricans receive relatively fewer private transfers than U.S. citizens. In Costa Rica, just

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up to 75 years of age is when net inter-living transfers become positive, it is, only those people older than 75 receive from the family more than they give. In the United States such situation occurs as from 67 years of age.

In relation to public transfers (part B of graph 3), Costa Ricans and Americans receive more than they pay until 20 to 25 years of age. The situation reverses again around 55 years of age in Costa Rica and at 63 in the United States. In Costa Rica, public transfers per capita for the youths are much lower, in relative terms, than in the United States. The opposite situation takes place among the elderly: the Costa Ricans receive from their government relatively more than U.S. citizens.
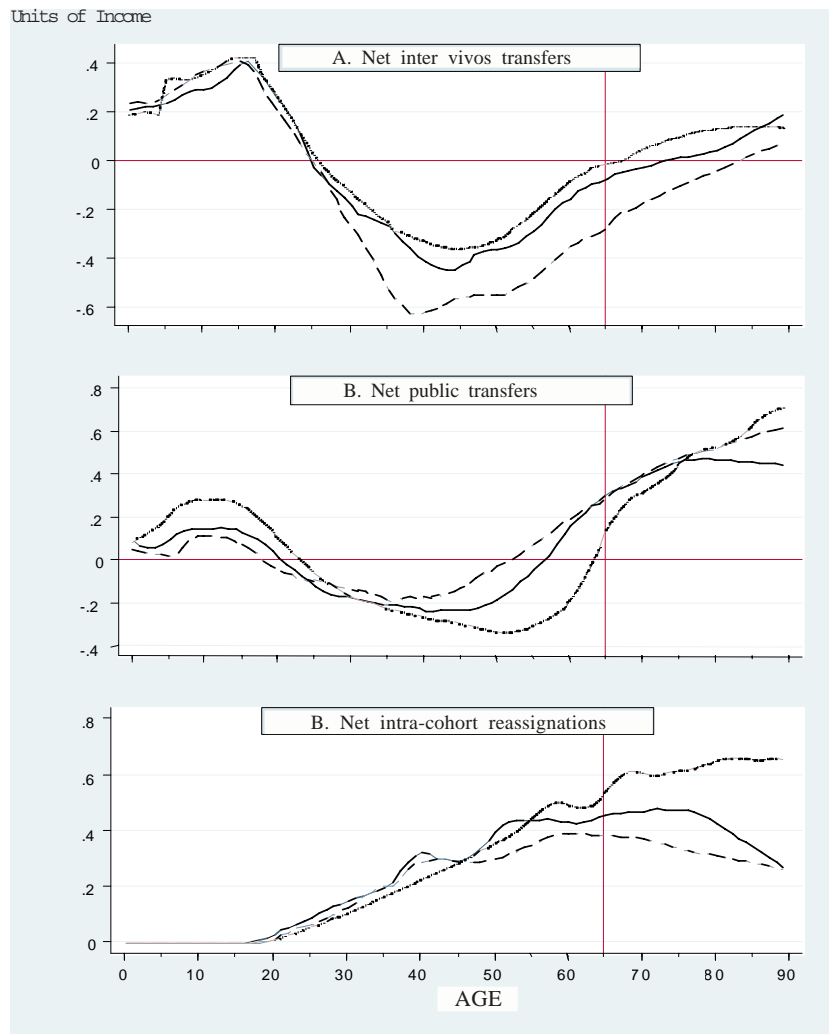
The relative income from actives substantially increased from 1988 and 2004 from 45 years of age, approximately (part C of graph 3). This change has made the Costa Rican curve approach that of the United States. Nonetheless, the Costa Rican aged people depend less than the Americans on the accumulation of actives. However, the change observed between 1988 and 2004 augurs that savings for advanced ages might become ever important in the country.

Demographic dividends

The results thus far presented here for the economy of the vital cycle work, essentially work as a measure of the population by age to estimate the demographic dividends. The basic supposition (which later might be removed with simulations) is that the patterns by age of DCV and transfers change very little along time.

As it was indicated, the first demographic dividend comes from the variation of the quotient of sustenance, which roughly corresponds to the inverse of the "relation of dependence", well known by demographers. The quotient of sustenance has increased from 67 producers per 100 actual consumers in 1970 to 88 in 2005, and it will continue growing up to a peak of 92 in 2020. The first demographic dividend is the variation rate in this quotient or, the same as the difference in the rates of growth in the number or actual producers (pondered population by each age's labor income) subtracting actual consumer (pondered population by consumption at each age). Graph 4 shows the trend in the first demographic dividend. Currently, around 2005, the dividend is 0.7 percent a year. This is to say, if nothing changed in the economy of the country, per capita product would grow 0.7 annually because of this dividend on its own. This dividend, which

GRAPH 3
PROFILE BY AGES OF PRIVATE AND PUBLIC TRANSFERS OF INCOME FROM
ACTIVES, COSTA RICA, 1988, 2004,
AND UNITED STATES, 2000

Units of Income

A. Net inter vivos transfers

B. Net public transfers

B. Net intra-cohort reassignations

AGE

Source: own elaboration based on data from the 200-2005 National Survey on Incomes and
Expenditures of the Households and the National Institute of Statistics and Censuses of Costa Rica and
National Transfer Accounts (NTA).

had a peak of more than 1 percent annual between 1976 and 1985, is smaller by the day and will disappear (it will become negative) as from 2021. It is worth mentioning that economy in Costa Rica will continue to receive this dividend for another 15 years in progressively smaller amounts.

While the first dividend comes from the increment of producers in relation to consumers and it is a bonus that will disappear, the second dividend is more stable and comes from the increment of productivity among labor force because of the deepening of the capital per laborer; it comes from the accumulation of capital and individual wealth to support the needs of consumption in old age. In this article we propose a simplified estimation of this dividend, consisting of the rate of growth of wealth in relation to the growth of the actual number of producers and the supposition of an elasticity product of 0.5 of the capital per worker. Graph 4 shows that Costa Rica enjoys the second demographic dividend as from 1990 approximately.

This dividend is on the rise and will continue doing it in the next two decades. As from around 2025, this dividend will slightly decrease, yet it will be positive and of the order of 0.5 annual until the end of our projection in 2060.

The first demographic dividend has two main action mechanisms, one familial and another fiscal. While the latter occurs through producers or enterprises, inside the households the dividend consist in improvements in the available income per member as a result from a relative larger amount of recipients. For the public sector, the dividend comes from the broadening of the taxpayers' base in relation to the demand of their services and transfers. The variation in the quotients of fiscal and familial sustenance estimates these two dividends as it is shown in graph 5. The familial dividend has been and is greater than the fiscal and it will also be lengthier. Current Costa Rican households would be increasing their wellbeing in more than one percent a year from the effect of this first demographic dividend exclusively. The familial dividend will ceases existing in 2027, year when the households will witness a reduction in their wellbeing as a result of the demographic changes.

The fiscal dividend nowadays is less than half the familial one and will become null in 2012, from here, the Costa Rican government will face adverse demographic conditions; in short, it will be a negative dividend. In the period prior to 2012, the Treasury has enjoyed this dividend, although to a lesser extent than families. It is necessary to say that the government has experienced an increment in its incomes faster than its obligations from demographic changes. Yet hard times come, as the dividend will become very negative (superior to less than one

GRAPH4
DEMOGRAPHICDIVIDENDS.COSTARICA,1970–2060
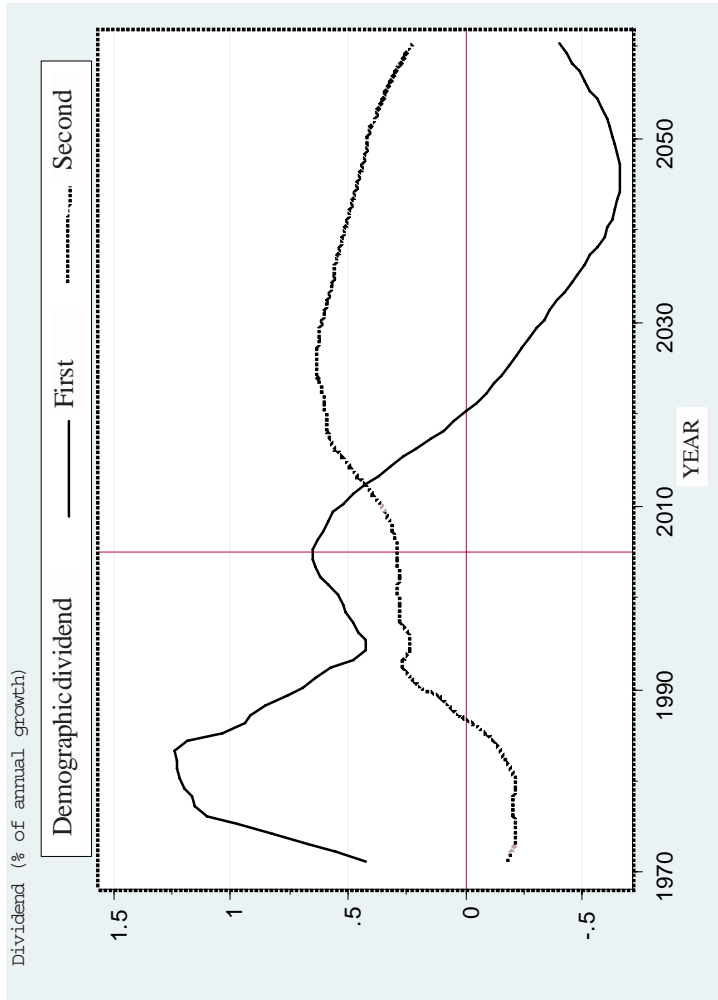
Dividend (% of annual growth)

Demographic dividend — First .... Second

Source: own elaboration based on data from the 2004-2005 National Survey on Incomes and Expenditures of the Households and the National Institute of Statistics and Censuses of Costa Rica.

percent annual) as from 2025, approximately. To counteract this negative effect, public finances must make important amends both in relation to tax collection and granting monetary and in-kind benefits.

GRAPH 5

FISCAL AND FAMILIAL DEMOGRAPHIC DIVIDEND. COSTA RICA, 1970–2060
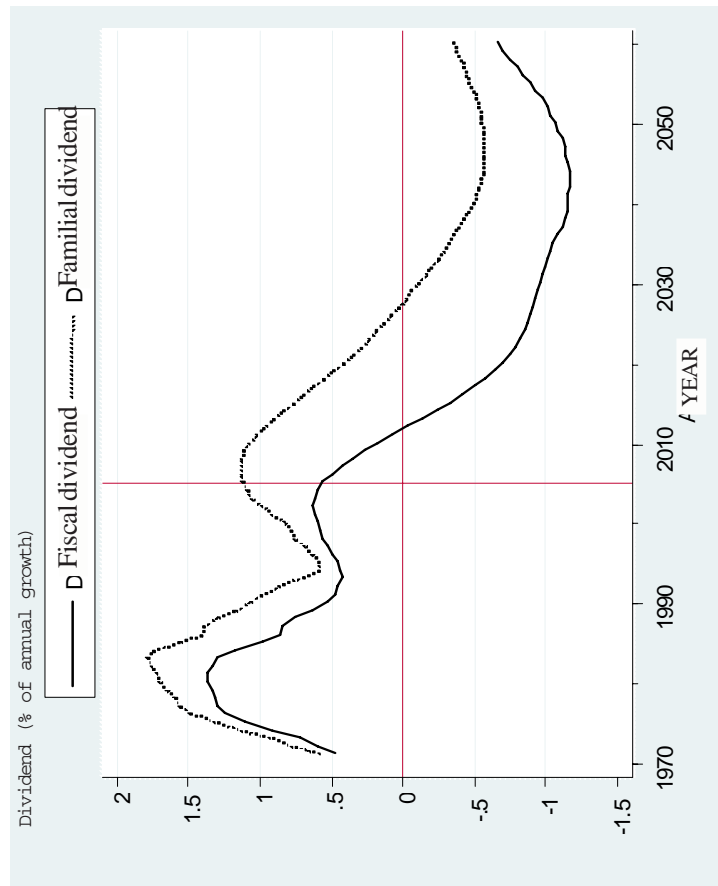
Source: own elaboration based on data from the 2004-2005 National Survey on Incomes and Expenditures of the Households and the National Institute of Statistics and Censuses of Costa Rica.

Discussion

The estimations of the economy of the vital cycle verify that the change in the structure by age of the population occurred as a consequence of the demographic dynamics in recent decades has had and will have important implications for the economic growth of the country, almost all favorable. The comparison of the income and consumption curves by age of the individuals shows that the period where the people produce in excess is shorter than what productive ages are considered (15 to 64 years of age). The period when there is a surplus between what people produce and consume is 33 years, from 24 to 57 years of age. These estimations are similar to those obtained for countries in southeastern Asia, the United States and Latin America (Lee *et al.*, 2005; Uthoff *et al.*, 2005; Bravo *et al.*, 2005). In the U.S., for instance, the extreme ages when income is greater than consumption are 26 and 57 years.

The profile by age of the economy of the vital cycle depends on the macroeconomic conditions of a country, the existence of public programs of pensions, health and education, as well as on the institutional stability of these programs. For instance, if the return people can expect from education increases, they will remain longer in the educational system, which will increase the age at which they begin to produce more than they consume. Likewise, to the extent to which people have had the opportunity to quote into a system of pensions, they will be able to retire earlier (or as soon as the system allows), which decreases the age when people stop producing more than they consume (Lee, 2003; Mason, 2003). Nonetheless, as we saw in the comparison of several curves, the variation between populations or epochs is not so large and the profiles by age of the vital cycle are relatively stable.

One of the results which are worth mentioning is the one referring to public transfers for the people older than 65 years of age. These are more than twice as many than in Taiwan and 1.7 times as many as in the United States. In Brazil it has been found that public transfers for the elderly are also generous (Turra, 2001). To which extent the generosity of public transfers for the elderly is a distinctive feature in Latin America? This is a point to be clarified, as well as its implications given the forthcoming aging of population.

On the other side and opposed to the expectations, private transfers between living people towards the age group of the elderly are almost inexistent in net terms. Pert of this result might be due to the fact that inside the group, the

structure by ages in Costa Rica is somewhat younger (60 percent are between 65 and 74 years of age compared to 55 percent in the United States). In any case, the curves by simple ages clearly show that the direction of the intergenerational flow of transfers in Costa Rica is inverted just toward the age of 75, compared with 67 in the U.S. To which extent the downward direction of generational transfers to advanced ages is a peculiarity of Costa Rica or is it common in other Latin American societies? This is another important point to clarify, as well as its future sustainability.

Besides the generous pension system, the social and familial organizations of the country may be the origin of this 'anomaly' in the intergenerational flow of transfers. Only 10 percent of the elderly live on their own in Costa Rica and an additional 19 percent live in two-people households. Almost two thirds co-reside with younger generations and in most of the cases they contribute to the budget of the household with their own incomes, many a times from pensions of the non-contributory regime of protection of the country, which, despite modest, seem to make an important difference.

According to Enigh-2004, two thirds of the elderly people receive a pension and most of the third which does not receive has a pensioned spouse. Around a third of the pensions are modest stipends of the non-contributory regime. Any Costa Rican in poverty conditions has the right to one of these pensions (circa 100 USD a month in 2007) as from 65 years of age. The generous and almost universal Costa Rican pension system has also another characteristic: many pensions are granted at early ages (before 60 years of age), however this is being controlled by means of legal measures in the last decade.

The results of the measurement of the vital cycle of the individual in relation to income and consumption allow showing in which manner the changes in the structure of the population affect the economic performance of the country. The first demographic dividend of the country is translated as an increment in the per capita product of the same magnitude as the dividend. In other words, the rate of per capita economic growth is composed of: a) the first demographic dividend, added to b) the rate of increment of productivity per laborer. If the increments in productivity were null, the complete growth would correspond to the first demographic dividend. Table 3, presents the estimations of the demographic dividends and per capita economic growth of Costa Rica in the last 25 years and in the next 25.

It is observed that the economic growth per inhabitant in the country was not robust in the 25 years prior to 2005: 24 percent in the period or average rates of less than 1 percent annual (in the 1980's decade per capita product was reduced in 1 percent and from 1990 to 2005 it grew 2.5 annual). This meager growth is approximately the same as the addition of the two demographic dividends of the period (0.7 percent and 0.2 percent, respectively). It is worth mentioning that if we believe in the existence of dividends, the productivity of the country would not have improved in 25 years, being verified the valuing in the same sense as other authors who document a stagnation between 1984 and 2000 (Rodríguez *et al*., 2004). Once we have seen the previous estimations, all or a considerable part of the growth of the economy in this quarter of century might have been exclusively due to the demographic dividend. This is obviously a crass generalization, as we know that in certain periods and in certain sectors there has been great dynamism, yet it has been counteracted by the stagnation and even regression of others.

For the next 25 years, the two dividends, especially the second, offer an important platform for a robust growth to Costa Rica. They give as a baseline a growth of 0.5 percent a year, this would represent a sixth of the longed three-percent annual growth that allowed doubling wellbeing in the lapse of a generation.

The fiscal dividend of the next 25 years will be, nonetheless, negative. The fiscal incomes might be reduced in 11 percent in relation to the obligations of the State because of the effect of demographic change (table 3). Public sector will have to cut down programs or modify their tributary policies. A reason why the fiscal dividend has been and will be lower is because of the dependence of the Treasury on indirect taxes paid by the consumer of every age; a tributary schema with heavier direct taxes, principally paid by productive ages, would have allowed it to be more benefitted from the demographic dividend and prevented part of the negative impact of the forthcoming demographic changes.

Another factor that weights on the poor fiscal dividend is the generational orientation which public transfers have had: generous for the older ages and mean for young ages. It was so demonstrated by the comparison with the profile of public transfers of the United States. The bias has been possible in Costa Rica because of the young structure of the population. The government might afford to be generous with the elderly as they were few. With the aging of the population, this bias might become unaffordable. The public sector, therefore, faces the challenge of relatively decrease transfers and services for the elderly

TABLE 3
PER CAPITA ECONOMIC GROWTH GENERATED BY DEMOGRAPHIC
DIVIDENDS; COSTA RICA, 1980-2030

Demographic dividends	Annual rate (%)		Complete period (%)	
	1980-2005	2005-2030	1980-2005	2005-2030
First dividend	0.72	0.14	20	4
Fiscal dividend	0.71	-0.40	19	-9
Familial dividend	1.08	0.55	31	14
Second dividend	0.15	0.52	4	15
Observed or desired growth	0.85	3.00	24	109

Source: own elaboration based on data from the 2004-2005 National Survey on Incomes and Expenditures of the Households and the National Institute of Statistics and Censuses of Costa Rica.

in favor of children and youths, in time when the explosive growth of adult population will give it a political weight (in the ballot boxes and as a group of pressure) heavier by the day.

The estimations of the demographic dividends must be cautiously interpreted; they are neither wealth nor real funds, but abstractions from stylized models. They indicate a potential economic growth and not an actual growth. The most solid proposition of the estimation is that the profiles of the economy of the vital cycle remain constant or, at least, they are exogenous to demographic change. If for instance, the relative increment of young adults will cause a relative diminution in the curve of their labor incomes, the effect of the first dividend will be lower or even null. Likewise, if for instance, the highest incomes from the first dividend were invested on human or physical capital, the effect of the dividend in the economy would be greater than that estimated.

The first dividend comes from the fast relative growth of the labor force; for the dividend to become material it is necessary that the opportunities of employment are broadened and respond to the demands for labor from the youths. To the extent to which the Costa Rican economy has been close to fulltime employment (or at least it has not been deteriorated in this aspect), we believe that the first dividend has been indeed materialized into its two components: more wellbeing for the households and a relief for fiscal pressures. However,

once again, in this aspect there are indirect consequences to be considered. If in the households it has only worked for increasing consumption (and not, for instance, to send children to university or accumulate a patrimony), it certainly has improved wellbeing, yet not in its full potential. If in the fiscal issue the dividend has allowed the governments to postpone necessary reforms, its positive effect would have been somehow perverted.

Asiatic countries, as South Korea and Taiwan, have apparently made a fruitful use of the first dividend and enormously improving their educational system (Mason, 2003 and Bloom and Williamson, 1997). The same cannot be said for Costa Rica, whose educational system has been delayed for decades in terms of coverage and even seems to be deteriorated in quality (Robles, 2005; Estado de la Nación, 2005).

The materialization of the second demographic dividend depends more than the first on certain policies. It requires that the saving rates remain at least constant. The original formulation by Mason and Lee (2006) assumes the propensity to save for advanced age increases in views of perceiving better life expectations. In this respect, generous pension policies generally discourage this sort of saving. In the same sense acts the lack of real estate and capital markets for the small savers. This is another aspect in which the country does not necessarily goes in the right direction. In relation to housing, Costa Rica has not achieved recovering the acquisitive power that households had in the years previous the crisis in the 1980's decade (Estado de la nación, 2005).

There is need as well for capital markets that: a) facilitate savings and b) turn capital into productive investment, instead of, public debt papers that finance expenditure and not investment. This is to say, certain institutional conditions are needed so that the deepening of capital per laborer becomes greater productivity. Likewise, the importance of macro economic stability to stimulate savings has been documented (Mason, 2003).

In Costa Rica there is plenty to do about these issues so that the country takes advantage of the second dividend. A sharp turn of the system of public transfers toward one that privileges the individual responsibility and, consequently, saving, would allow making a better use of the second dividend; the reforms of the last decade in the system of pensions, in particular the creation of the obligatory and voluntary individual retirement funds has been a step toward the correct direction.

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