

Cuban Social Security: A Preliminary Actuarial Analysis of Law #24 of Social Security

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I. Introduction

Law #24 on Social Security is the main piece of legislation defining the benefits that are covered under Social Security in Cuba. This Law, which was approved on August 28, 1979, and the subsequently adopted Social Security regulations provide the legal framework to provide old age retirement, disability, and survivor's pensions to Cuban workers and their families. The benefit promises in the Law are probably the most far reaching legacy of Cuba's revolution. They are meant to apply when the current leadership is not longer alive, and the current generation of workers have been substituted by a younger workforce. This younger workforce was not even born when the legislation took effect, and will be asked to pay for the promises that their predecessors made to themselves.

This paper outlines the results of a preliminary actuarial analysis of Law #24. This analysis was conducted through an actuarial model that estimates the retirement pensions of the current working population and those who are expected to enter the workforce during the years between 1991 and 2010. The model is also used to estimate the cost of providing retirement benefits as a percentage of the salaries which these workers are expected to receive during their entire career.

The results of the actuarial model support the idea that changes are needed to both the current benefit promises as well as the financing of those promises. This paper explores the cost effect of two benefit changes: postponing the retirement age to 65, and the elimination of the current retirement benefit promise for those younger than 45 on January 1, 1995. It also outlines a mechanism to improve the financing of retirement benefits through the funding of the pension obligations during the active service of the system participants.

II. Law # 24 on Social Security

Law # 24 on Social Security (The Law) and the subsequently adopted Regulations of the Social Security Law provide for two regimes of social benefits: Social Security and Social Assistance. The Social Security regime provides benefits for insured participants and their beneficiaries, while the Social Assistance regime provides benefits for those persons who are not insured under the Social Security regime. The Law includes in the Social Security regime all individuals who receive salaries or wages for their work in Cuba and those who work for Cuban entities abroad. It also extends coverage to the families of the workers included in the Social Security regime.

The Social Security regime provides three kinds of benefits: those provided through services, those provided in kind, and those provided through monetary payments. Benefits provided through services include medical and dental assistance provided through health professionals and facilities. Benefits provided in kind include medicines for hospitalized patients, and prosthetic devices for disabled workers. Benefits provided through monetary payments include pensions paid to old age retirees, disabled individuals, surviving spouses and children of insured individuals, female participants during their maternity leave, and employees who fall ill or become injured.

In 1989, old age retirement, disability, and survivor's pensions amounted to \$1,042.5 billion of the \$1,282.6 billion paid through Social Security. For the same year, the second largest Social Security monetary expenditure was for sickness, accident, and maternity subsidies which together totaled \$178.9 million. Both of these expenditures constituted 95 percent of all Social Security expenditures through

monetary payments for that year.

A. Retirement Pensions under the Law

Old age retirement pensions can be paid after a service period of 25 years. Ordinary retirement age is 60 for men and 55 for women, except for those who have worked at least 12 years in dangerous conditions who can retire 5 years earlier. Employees can retire with an extraordinary pension after 15 years of service once they reach a late retirement age of 65 for men, and 60 for women.

The old age pension equals 50 percent of the average salary (of the best five of the last ten years) plus either 1 percent or 1.5 percent of average salary per year of service in excess of 25. There are increases for ordinary retirement after age 60/55. The extraordinary retirement pension formula is equivalent to the ordinary retirement formula. The annual average salary used to calculate the retirement pension is reduced by 50 percent for the amount in excess of \$3,000.

B. Disability Pensions under the Law

According to the Law disability pensions are paid under both temporary disability and total or partial disability. The temporary disability benefit is set equal to a fixed percentage of the salary at time of disability. This percentage varies according to whether the disability is due to occupational injury or sickness, and whether the worker is hospitalized. The total or partial disability formula is very similar to the old age retirement benefit formula except that it takes into account expected future years of service for those who become disabled before age 45 and do not yet have 25 years of service.

C. Survivor's Pensions under the Law

Social Security pensions are also paid to surviving spouses and relatives of covered workers and pensioners. The surviving spouses eligible for a Social Security pension are the wives of covered workers, and the husbands of covered workers who are economically dependent on their working or pensioner wives. Pensions are also paid to dependent children and parents.

There are two types of survivor's pensions: the provisional pension which lasts up to three months after death, and the definitive pension which is paid after the provisional pension. The amount of the definitive survivor's pension is equal to a percentage, which varies according to the number of beneficiaries, of the Social Security pension the deceased worker would have received had he retired or become disabled at the date of death. The survivor's pension is adjusted for duration and amount depending on whether the surviving wife works or not.

D. Financing of the Law's Benefit Promises

The Law does not address two significant aspects of other Social Security systems: financing of the Social Security benefits, and periodic updates of the amounts established in the Law. The financing of Social Security benefits is done through the payment of a percentage of total payroll by the employer to the state. This percentage has normally been 10 percent but it can be changed through the State Budget Law.

The second aspect which is not addressed in the Law is the issue of periodic updates for pensions in payments, and amounts defined in the Law. This leads one to conclude that either at the time of enactment there was an expectation of little or no future inflation, or a deliberate desire to allow pensions to deteriorate over time.

III. The Preliminary Actuarial Model

The preliminary actuarial model of Cuban Social Security focuses on old age retirement pensions as the main cause of payouts from the system. As mentioned in the previous section, most Social Security payments are due to old age retirement, disability, and survivor's pensions, and the Model assumes that most of those payments are due to old age retirement. Payments for short term disability, sickness and maternity are also ignored.

A. Benefits Valued in the Model

The model assumes that all pensions paid under Social Security are due to old age retirement. Old age retirement is assumed to occur at age 60 for men, and age 55 for women under the current system scenarios, and 65 for men and women under the alternate scenarios. Upon death after old age retirement, it is assumed that 70 percent of the old age pension is continued to be paid to the surviving widow, but no payment is made for surviving widowers.

B. Demographic Data

The model begins its projection period on January 1, 1991 using the distribution by age and sex of the Cuban population as of December 31, 1990. The population distribution by age for those older than 25 and younger than 65 was obtained by distributing the published quinquennially grouped population assuming uniform number of births during the five years of the quinquennial group. The population over age 65 was distributed between age 65 and 80 by assuming a uniform number of annual births for all the members of this group. The actual number of people in each single age reflected the effect of mortality since date of birth. Table I shows the assumed number of individuals for each age and sex on January 1, 1991.

It was assumed that all the males older than 59, and all the females older than 54, were old age pensioners with an average monthly pension of \$78 (\$936 per year). All those younger than ordinary retirement age and older than 15 were assumed to be eligible to participate in the Social Security system as active participants with an average monthly average salary of \$188 (\$2,256 per year) in 1991. Active participants are expected to earn pensionable service according to an estimate of the general employment level for each age. Table II shows the percentage of the population which is assumed to be employed at each age.

New entrants into the Social Security system are assumed at the beginning of each year from 1992 through 2010. These new entrants are assumed to be 15 at time of entry into the model, and to have an annual salary of \$2,400 adjusted for future salary increases. They are equally distributed between males and females. The number of new entrants for each projection year before 2006 was based on the projection of the December 31, 1990 data to the entry date adjusting for mortality. The number of annual new entrants after 2005 was calculated based on an estimate of the number of births from 1991 and 1995 surviving to the entry year. Table III shows the assumed number of new entrants for each year from 1992 to 2010.

C. Economic Assumptions

The model uses four main economic variables: long term interest rate, long term salary increase rate, rate of Social Security increases to legally defined amounts, and rate of inflation. By changing these economic variables, three economic scenarios were developed to measure the costs and liabilities of the Social Security system. The economic scenarios were: Socialist Stasis, Caribbean Basin Initiative-Real, and Caribbean Basin Initiative-US\$ Nominal.

The Socialist Stasis scenario assumed that all economic variables were equal to 0 percent. This scenario reflects an economy which is fully indexed and where there are no costs associated with the borrowing of

money.

Caribbean Basin Initiative-Real scenario assumed that there would be a real (net of inflation) interest rate of 6 percent, and that salaries would increase in real terms beginning in 1998 at .7 percent and at 2.3 percent after 2002. There would be no adjustments to pensions in payment and Social Security amounts will remain fixed.

Caribbean Basin Initiative-US\$ Nominal scenario reflects a situation where the Cuban economy will be US\$ denominated but that there would still be a small risk differential in interest rates between the US long term interest rates and Cuba's. This scenario assumes an interest rate of 9 percent, salary increases starting at 3 percent through 1997, 3.7 percent for the years 1998 through 2002, and 5.3 percent after 2002. Social Security amounts are assumed to be indexed at a rate of 3 percent. Pensions in payment are not indexed with inflation. This scenario uses an underlying assumption of US\$ inflation of 3 percent.

Table IV in the Appendix summarizes the economic assumptions used for each scenario.

D. Actuarial Assumptions

The Model uses a table of probabilities of death during a particular age based on both published Cuban data, and US data. Mortality rates for each age between age 0 and age 79 were developed from the expected life for single ages from age 0 through age 80.

Mortality rates from age 80 to 100 were developed adjusting the 1970 US Census mortality to match the expected life at age 80 published by Cuban sources. Table V in the Appendix shows the probabilities of death at each age between 0 and 100 for males and females separately.

The Model assumes that the only reasons to exit the Social Security system are death or old age retirement. Old age retirement is assumed to occur at age 60 for males, and 55 for females, except in the alternate scenarios when retirement is assumed to occur at age 65.

E. Actuarial Method

The model is used to estimate three sets of figures: the total pensions paid to active participants during the valuation period (1991 to 2100), the salaries paid during the valuation period to active participants who were in the Social Security system during the projection period (1991 to 2010), and the present value of those two items at the beginning of each year during the projection period.

The total pension payments expected to be made in the kth year after January 1, 1991 is calculated as follows:

$$B_{1991+k} = \dots \sum_{x:k} c_x k p_x b_{x:k}$$

where

c_x is the number of participants of age x alive on January 1, 1991,

$k p_x$ is the probability of surviving to age $x+k$ for someone age x ,

$b_{x:k}$ is the average pension paid during year k to individuals age x on January 1, 1991.

It must be noted that $b_{x:k}$ is equal to zero before retirement. At retirement date it is equal to 2 percent of final pensionable pay times years of accrued service less than 25 plus 1 percent of final pensionable pay times years of accrued service in excess of 25. Final pensionable pay is equal to the average of the last five years of annual salary preceding retirement. Years of accrued service reflect the percentage of people working at each age.

The total salaries expected to be paid during a particular year were calculated as follows:

$$S_{1991+k} = \dots c_{x+k} p_{x:k} s_{x:k} e_x$$

where

c_x is the number of participants of age x alive on January 1, 1991,

$p_{x:k}$ is the probability of surviving to age $x+k$ for someone age x ,

$S_{x:k}$ is the average salary paid during year k to individuals age x on January 1, 1991.

$S_{x:k}$ is set equal to zero for $x+k$ greater than retirement

e_x is the percentage of the population age x who are actively employed.

The present value of future benefits (PVFB) and the present value of future salaries (PVFS) were calculated by discounting the series of payments, B_{1991+k} , and S_{1991+k} , to a particular date. The ratio of present value of future benefits to the present value of future salaries was used to determine the contribution percentage required to finance the future benefits of all the active participants in the Social System at a particular date.

The calculation of the present values was facilitated by the use of the standard actuarial commutation functions D_x and N_x (12). They were also used to reflect monthly payments of pensions and salaries.

IV. Problems With the Cuban Social Security Retirement Promise

Social Security benefits are normally financed through two mechanisms: payroll taxes, and general revenue. If one assumes that the economy and the population will continue to grow into the future, one can finance future pension payments out of future salaries. This method is normally known as the pay-as-you-go system. Under this system, future payroll taxes may not be sufficient to meet future pension payments under a variety of scenarios.

At least three of those scenarios are relevant to Cuba. The first is that over time, as shown in Table VI, the proportion of the working age population to the population eligible for retirement increases from 4.53 potential workers per potential retiree in 1991 to an estimated 3.24 potential workers per potential retiree in 2010. The second is that there is a generation of Cuban workers which is much larger than the following generation of workers. These workers were born during a "baby boom" which lasted from 1960 through 1980, and they are followed by a smaller generation of workers which were born during the "baby bust" of the following years.

Another problem with the Cuban Social Security system is that it promises a very large pension of at least 50 percent of final average pay after 25 years of service. A simple calculation, assuming no inflation, no salary increases, and an interest rate of 0 percent, shows that a new entrant into the system who works for 40 years, and then lives for 20 years after retirement will have to contribute 32.5 percent of salary during his work career to accumulate at retirement an amount equal to the expected benefit

payments.

Another problem of the system is the absence of any assets designated to meet the existing pension obligations of the current retirees. This means that the Cuban "baby boomers" will have to pay the pensions of their older countrymen and at the same time make some provision for their old age retirement since the following generation is smaller and less able to sustain them in their retirement.

V. Funding the Social Security Retirement Promise

One can measure the financial burden of retirement pension system by comparing the present value of future pensions to the present value of future salaries for current participants in the system. The resulting ratio can be used to determine a contribution rate as a percentage of salary. This ratio does not reflect inter-generational financing since it does not take into account the future salaries of generations not contributing to the system yet, but it is an appropriate measure of the overall cost of the retirement promise that current participants have made to both the current pensioners and themselves.

The Model was used to determine a contribution rate as a percentage of salary under each of the three economic scenarios. The results for the current Social Security system are shown in Table VII. It is clear that under the Socialist Stasis scenario, the current Social Security system can only be financed by general revenues and future yet to be quantified inter-generational transfers of wealth. This scenario assumes no inflation, no salary increases, and no discount rate.

The two Caribbean Basin Initiative scenarios show more moderate contribution rates of between 27 percent and 34 percent in 1991 but which increase to 30 percent and 41 percent by 2010. The reduction in the contribution rate for those scenarios is largely due to the introduction of an interest rate of 6 percent and 9 percent with no adjustment of the pensions after payment commencement.

The increase in the contribution rates over time is due to the aging of the population and the fact that there are no accumulated assets to meet future obligations. The above contribution rates assume that there are no assets accumulated between valuation dates, but that assets would be accumulated starting on the valuation date. The above contribution rates are greater than the contribution rate needed to pay pensions in payment in a given year, but they are meant to reduce the contribution rate in the following years.

Even under the CBI scenarios the contribution rates are excessive since they are only financing a portion of the total Social Security system. It should be noted that the current contribution rate for the entire Cuban Social Security system is 10 percent of salaries. These high contribution rates indicate that the system will significantly reduce the income of current workers if they are to pay the pensions of current pensioners as well accumulate funds for their retirement pensions.

VI. Improving the Soundness of the Retirement Promise

This paper will explore three possible changes to the Social Security system as to improve the soundness of the retirement promise. All are aimed to stabilize and reduce the contribution rate over the long term.

A. Postponing Retirement

The current retirement age of 60 for men, and 55 for women is low when compared to other countries in Latin America and the OECD. Increasing the normal retirement age to 65 would improve the financial health of the system by increasing contributions from workers who remain active longer, and by shortening the number and deferring the start of the pension payments.

As shown in Table VIII, the contribution rates are reduced from their current levels under all three scenarios if one postpones retirement to 65. Nonetheless they remain very high under Socialist Stasis, and somewhat high under the CBI scenarios.

B. Changing the Current Retirement Promise for Younger Workers

One radical departure from the current Social Security system would be to eliminate the retirement promise of Law #24 for younger workers, and instead to provide their retirement income through the accumulation of their contributions into individual accounts. There are various Social Security systems around the world which are based on similar arrangements of accumulating Social Security contributions into individual accounts. The oldest and best known in the Americas is the Chilean Social Security system. This system is also used in various Asian and African countries where it is known under the name of Provident Funds.

The pensions of older workers and current retirees will continue to be paid through payroll taxes levied on all workers. The required contribution rates to pay the pensions of older workers are shown in Table IX if one assumes that the cutoff age for participation in the current system is 45 on January 1, 1995.

By excluding the younger workers, the contribution rate falls significantly for the Socialist Stasis scenario and is also reduced for the CBI scenarios. The trend in the contribution rate is down over time, as there are less and less pensions to be paid out of the old system. This new system requires the setting of two contribution rates: one to finance the retirement promise of those older than 45 at the time of transition, and another to finance the retirement promise of those younger than 45.

There are two choices in setting the contribution rate to finance the pensions of the older population: to set it in order to pay only pensions as they are paid, or to set it so that only the current participants in the system will pay these pensions. The contribution rates under the first scenario are shown in Table X for select years. This table shows the ratios of expected total salaries to expected total pensions during the projection period. The contribution rates required to finance the current pensions through only the contributions of the current active participants are shown in Table IX.

The contribution rate required for those younger individuals excluded from the current system depends mainly on the following: the target replacement rate, the investment return of the accumulated contributions, and the salary increase history of the participant. An adequate target replacement rate could be 50 percent of final salary at age 65 after 30 years of contributions with a 70 percent continuation of the pension to the surviving spouse of the retiree. The contribution rate that is required to accumulate a fund at retirement equal to the present value of such target benefit would range from 9 percent under the CBI US\$ Nominal scenario to 10.5 percent under the CBI Real scenario to 32 percent under the Socialist Stasis scenario.

These contribution rates were derived assuming that the accumulated contributions would earn interest at the same rate assumed in each scenario, and that the salaries of the participant would increase at the ultimate rate assumed in each scenario: 0 percent, 2.3 percent, or 5.3 percent. The accumulated funds were converted to a pension using annuity factors developed using the mortality shown in Table V and the interest rate of each scenario.

C. Funding the Retirement Promise

The contribution rates mentioned so far are based on the assumption that on any particular date there are no assets corresponding to the retirement obligations. On the other hand, they presuppose that future contributions in excess of future benefit payments will be accumulated in a fund. The existence of assets

reduces the required level of contributions therefore it would be appropriate to fund a portion of the retirement promise to those remaining in the current system through the establishment of a Social Security Fund.

There are two possible sources of contributions to this Social Security Fund. The first source consists of moneys collected through payroll taxes. This paper has discussed extensively the required level for those contributions. The second possible source would be cash or equity derived from the privatization of state assets. The determination of which state assets should be transferred to this Fund is beyond the scope of this paper, but it should be considered as a mechanism to reduce the burden of financing the current retirement promise through payroll taxes.

VII. Certain Limitations of the Model

This Model of Cuban Social Security is not a budgeting tool, but rather an experimental and analytical aid. As such, it ignores some significant aspects of the current Social Security system in Cuba which are noted below.

A. Limitation to Retirement Benefits

The Model ignores other monetary benefits paid through the Law: disability, death in service, and maternity payments. Disability benefits were not included in this Model because there was no data available on either current disabled pensioners in Cuba, nor the incidence of disability among Cuban workers. Death in service pensions were ignored in order to simplify the Model and to make it reproducible by other researchers. Maternity subsidies were excluded also for the sake of simplicity.

Based on the Chilean Social Security experience, which privately insures disability and survivor's pensions through payroll taxes of between 2.5 percent and 3.74 percent of pay, one can estimate that including disability and survivor's coverage into the Model would cost between 4.0 percent and 4.5 percent of pay.

B. Other Social Security Systems

Law #24 is the main but not the only legislation regarding Social Security in Cuba. The Armed Forces, and the Ministry of Interior personnel are covered under Laws #101, and #102. The terms and amounts of their benefits exceed those of Law #24. In view that a conservative estimate of the personnel in both of these entities is around 250,000, a serious reform of Cuban Social Security must address the financing of these benefits. The lack of demographic data on the population covered under Laws #101, and #102 is the main obstacle to modeling their Social Security obligations.

There are other sectors of the Cuban population that are also not covered by Law #24. The results from the Model are misleading in so far that we assumed that all potentially economically active Cubans are covered under Law #24.

C. Economic Assumptions

The three economic scenarios were derived from either existing conditions (Socialist Stasis), or two possible transition scenarios derived from Armando Lago and José Alonso's seminal paper (CBI Real and CBI-US\$ Nominal). The results produced under each scenario will be invariant under actual inflation so long as it affects equally interest rates, salary increases, social security increases, and pension increases. This is not a realistic assumption in a high inflation environment when salary increases tend to trail inflation, interest rates reflect estimated inflation risks, and pensions are adjusted on an ad-hoc basis.

D. Employment and Contribution Assumption

The Model assumes that a percentage of the population at each age will be working and therefore contributing to the Social Security system. This percentage remains constant during the projection period. The reality is likely to be quite different during an economic adjustment period when the number of workers in Cuba would decrease as a percentage of the working age population. Also it is not clear that the all workers would participate in the System as there would be a considerable short-term financial benefit to those workers who avoid the payroll tax associated with contributions to the System.

Non-participation in the system would not generate additional costs as long as the benefits paid out of the system to a given participant are set according to the contributions made by that participant to the system as is the case for the proposed system for younger participants. Evasion of payroll taxes by active participants will increase the contribution rate required to pay the pensions for current pensioners, and it may increase the contribution rate required to pay the pensions of future pensioners.

VIII. Concluding Observations

The current Cuban Social Security system requires large amounts of contributions to finance the retirement benefit promised to its participants. Changing the retirement age to 65 for men and women would reduce the level of contributions required to finance the current System but these contributions would remain large as a percentage of payroll. Changing the current system from a pay-as-you-go system to one where younger workers will accumulate funds toward their retirement would greatly reduce the burden of making inter-generational transfer payments. There would still be a significant transfer of funds from workers to current pensioners and older workers who remain in the current System but those contributions could be reduced by the creation of a Social Security Fund with contributions of payroll taxes and state assets.

Table I
Distribution of Cuban Population by Attained Age and Sex at January 1, 1991

Age	Males	Females	Total	Age	Males	Females	Total
0	96,062	88,854	184,916	40	66,670	68,273	134,943
1	94,641	88,209	182,850	41	66,482	68,130	134,612
2	95,356	90,541	185,897	42	66,271	68,003	134,274
3	90,418	85,915	176,333	43	66,055	67,836	133,891
4	83,750	79,153	162,903	44	65,833	67,683	133,516
5	90,355	86,421	176,776	45	59,218	60,015	119,233
6	82,450	78,834	161,284	46	58,989	59,838	118,827
7	82,172	78,132	160,304	47	58,735	59,656	118,391
8	79,195	75,829	155,024	48	58,455	59,469	117,924
9	67,746	64,486	132,232	49	58,168	59,259	117,427
10	67,742	64,590	132,332	50	52,087	52,065	104,152
11	70,699	66,778	137,477	51	51,776	51,852	103,628
12	72,215	69,186	141,401	52	51,437	51,616	103,053
13	81,014	77,155	158,169	53	51,089	51,354	102,443
14	91,442	86,932	178,374	54	50,689	51,085	101,774
15	94,056	90,898	184,954	55	40,685	40,767	81,452

16	97,075	94,616	191,691	56	40,327	40,507	80,834
17	110,273	105,853	216,126	57	39,941	40,223	80,164
18	120,445	116,438	236,883	58	39,544	39,931	79,475
19	122,726	117,625	240,351	59	39,097	39,595	78,692
20	112,134	108,440	220,574	60	36,450	36,382	72,832
21	115,935	111,416	227,351	61	35,948	36,036	71,984
22	116,782	112,412	229,194	62	35,432	35,644	71,076
23	116,430	112,026	228,456	63	34,862	35,241	70,103
24	122,265	120,452	242,717	64	34,235	34,788	69,023
25	117,826	116,502	234,328	65	36,345	35,534	71,879
26	117,223	115,877	233,100	66	35,585	34,997	70,582
27	114,238	113,029	227,267	67	34,784	34,444	69,228
28	109,260	108,053	217,313	68	33,938	33,874	67,812
29	101,582	100,356	201,938	69	33,048	33,241	66,289
30	85,636	86,398	172,034	70	32,111	32,566	64,677
31	77,320	77,893	155,213	71	31,101	31,823	62,924
32	71,290	71,750	143,040	72	30,044	31,034	61,078
33	68,946	69,376	138,322	73	28,885	30,148	59,033
34	68,482	69,340	137,822	74	27,681	29,189	56,870
35	71,857	72,538	144,395	75	26,406	28,131	54,537
36	71,696	72,437	144,133	76	25,009	26,948	51,957
37	71,531	72,334	143,865	77	23,582	25,700	49,282
38	71,362	72,228	143,590	78	22,074	24,389	46,463
39	71,171	72,120	143,291	79	20,552	23,020	43,572
				80	18,784	21,559	40,343

Table II
Percentage of Cuban Population expected to be Employed by Attained Age and Sex

Age	Males	Females	Age	Males	Females
0	0 percent	0 percent	40	83 percent	54 percent
1	0 percent	0 percent	41	83 percent	54 percent
2	0 percent	0 percent	42	83 percent	54 percent
3	0 percent	0 percent	43	83 percent	54 percent
4	0 percent	0 percent	44	83 percent	54 percent
5	0 percent	0 percent	45	76 percent	40 percent
6	0 percent	0 percent	46	76 percent	40 percent
7	0 percent	0 percent	47	76 percent	40 percent
8	0 percent	0 percent	48	76 percent	40 percent
9	0 percent	0 percent	49	76 percent	40 percent
10	0 percent	0 percent	50	76 percent	40 percent

11	0 percent	0 percent	51	76 percent	40 percent
12	0 percent	0 percent	52	76 percent	40 percent
13	0 percent	0 percent	53	76 percent	40 percent
14	0 percent	0 percent	54	76 percent	40 percent
15	0 percent	0 percent	55	76 percent	14 percent
16	0 percent	0 percent	56	76 percent	14 percent
17	35 percent	24 percent	57	76 percent	14 percent
18	35 percent	24 percent	58	76 percent	14 percent
19	35 percent	24 percent	59	76 percent	14 percent
20	35 percent	24 percent	60	22 percent	1 percent
21	35 percent	24 percent	61	22 percent	1 percent
22	35 percent	24 percent	62	22 percent	1 percent
23	35 percent	24 percent	63	22 percent	1 percent
24	35 percent	24 percent	64	22 percent	1 percent
25	72 percent	52 percent	65	5 percent	1 percent
26	72 percent	52 percent	66	5 percent	1 percent
27	72 percent	52 percent	67	5 percent	1 percent
28	72 percent	52 percent	68	5 percent	1 percent
29	72 percent	52 percent	69	5 percent	1 percent
30	72 percent	52 percent	70	5 percent	1 percent
31	72 percent	52 percent	71	5 percent	1 percent
32	72 percent	52 percent	72	5 percent	1 percent
33	72 percent	52 percent	73	5 percent	1 percent
34	72 percent	52 percent	74	5 percent	1 percent
35	83 percent	54 percent	75	5 percent	1 percent
36	83 percent	54 percent	76	5 percent	1 percent
37	83 percent	54 percent	77	5 percent	1 percent
38	83 percent	54 percent	78	5 percent	1 percent
39	83 percent	54 percent	79	5 percent	1 percent
			80 and Older	5 percent	1 percent

Table III
Distribution of Active Population by Date of Entry into the Social Security System

Year	<u>Entry before 1991</u>	<u>Entry after 1990</u>	<u>Total</u>
1991	6,776		6,776
1992	6,760	89	6,849
1993	6,654	247	6,901
1994	6,549	387	6,936
1995	6,443	525	6,968
1996	6,337	656	6,993

1997	6,231	772	7,003
1998	6,110	924	7,034
1999	5,988	1,083	7,071
2000	5,866	1,242	7,108
2001	5,744	1,417	7,161
2002	5,621	1,566	7,187
2003	5,487	1,739	7,226
2004	5,352	1,922	7,274
2005	5,218	2,101	7,319
2006	5,083	2,280	7,363
2007	4,948	2,453	7,401
2008	4,804	2,636	7,440
2009	4,660	2,818	7,478
2010	4,516	2,998	7,514

Table IV
Main Economic Assumptions used under each Scenario

	<u>SocialistStasis</u>	<u>CBI - Real</u>	<u>CBI-US\$ Nominal</u>
1 Interest Rate	0.00 percent	6.00 percent	9.00 percent
2. Salary Increases			
a. From 1991 through 1997	0.00 percent	0.00 percent	3.00 percent
b. From 1998 through 2003	0.00 percent	0.70 percent	3.70 percent
c. 2004 and beyond	0.00 percent	2.30 percent	5.30 percent
3. Increases in Social Security Constants	0.00 percent	0.00 percent	3.00 percent
4. Increases of Pensions in Payment	0.00 percent	0.00 percent	0.00 percent

Table V
Probability of Death during Age x

<u>Age x</u>	<u>Males</u>	<u>Females</u>	<u>Age x</u>	<u>Males</u>	< U > Females
0	0.013178	0.010056	50	0.005972	0.004089
1	0.001112	0.001058	51	0.006549	0.004565
2	0.000845	0.000669	52	0.006765	0.005069

3	0.000571	0.000407	53	0.007812	0.005232
4	0.000579	0.000550	54	0.008082	0.006173
5	0.000587	0.000418	55	0.008807	0.006380
6	0.000447	0.000282	56	0.009580	0.007010
7	0.000453	0.000286	57	0.009938	0.007259
8	0.000613	0.000290	58	0.011297	0.008403
9	0.000467	0.000295	59	0.012245	0.009170
10	0.000316	0.000149	60	0.013786	0.009519
11	0.000482	0.000303	61	0.014349	0.010875
12	0.000489	0.000308	62	0.016092	0.011311
13	0.000663	0.000313	63	0.017964	0.012841
14	0.000842	0.000635	64	0.018750	0.013385
15	0.000855	0.000645	65	0.020888	0.015125
16	0.001043	0.000819	66	0.022526	0.015805
17	0.001237	0.000832	67	0.024303	0.016550
18	0.001078	0.000845	68	0.026237	0.018679
19	0.001462	0.000859	69	0.028346	0.020308
20	0.001301	0.000873	70	0.031457	0.022811
21	0.001324	0.000888	71	0.034002	0.024787
22	0.001540	0.000903	72	0.038567	0.028548
23	0.001568	0.000735	73	0.041667	0.031814
24	0.001596	0.000935	74	0.046059	0.036265
25	0.001626	0.000952	75	0.052916	0.042025
26	0.001657	0.000970	76	0.057078	0.046324
27	0.001479	0.000790	77	0.063932	0.051010
28	0.001723	0.001007	78	0.068966	0.056117
29	0.001978	0.001026	79	0.086025	0.063473
30	0.001794	0.001047	80	0.094400	0.078463
31	0.002060	0.001282	81	0.103475	0.086025
32	0.001871	0.001090	82	0.113013	0.094400
33	0.002151	0.001335	83	0.123025	0.103475
34	0.002198	0.001137	84	0.134063	0.113013
35	0.002248	0.001394	85	0.146400	0.123025
36	0.002301	0.001425	86	0.158963	0.134063
37	0.002355	0.001458	87	0.171350	0.146400
38	0.002680	0.001492	88	0.184100	0.158963
39	0.002473	0.001782	89	0.198350	0.171350
40	0.002817	0.002085	90	0.214613	0.184100
41	0.003178	0.001870	91	0.232125	0.198350
42	0.003262	0.002464	92	0.250288	0.214613
43	0.003351	0.002247	93	0.268688	0.232125

44	0.003756	0.002594	94	0.287200	0.250288
45	0.003862	0.002959	95	0.304225	0.268688
46	0.004305	0.003040	96	0.320463	0.287200
47	0.004772	0.003125	97	0.335850	0.304225
48	0.004916	0.003536	98	0.350375	0.320463
49	0.005429	0.003970	99	0.350375	0.335850

Table VI
Distribution of Cuban Population by Age Groups from 1991 to 2010

Year	<u>14 and Younger</u>	<u>15 to Retirement Age</u>	<u>Over Retirement Age</u>	<u>Total</u>
1991	2426272	6775630	1492567	10694469
1992	2433172	6848651	1540504	10822327
1993	2460933	6,901,117	1,584,926	10946976
1994	2505121	6936494	1625859	11067474
1995	2551593	6967613	1663370	11182576
1996	2600644	6993256	1697558	11291458
1997	2646705	7002529	1744458	11393692
1998	2666006	7034287	1788185	11488478
1999	2676698	7071031	1828937	11576666
2000	2682959	7108473	1866948	11658380
2001	2670417	7161002	1902444	11733863
2002	2668923	7186858	1948149	11803930
2003	2650064	7225799	1991709	11867572
2004	2619155	7273888	2033345	11926388
2005	2589748	7318509	2073271	11981528
2006	2559033	7362760	2111660	12033453
2007	2523906	7401029	2157922	12082857
2008	2487216	7439683	2202851	12129750
2009	2450516	7477742	2246545	12174803
2010	2415894	7513894	2289045	12218833

Ratio of Working Age (15 to Retirement Age) Population to Population Group

<u>Year</u>	<u>14 and Younger</u>	<u>15 to Retirement Age</u>	<u>Over Retirement Age</u>	<u>Total</u>
1991	2.79	1	4.54	0.63
1992	2.81	1	4.45	0.63
1993	2.8	1	4.35	0.63
1994	2.77	1	4.27	0.63
1995	2.73	1	4.19	0.62

1996	2.69	1	4.12	0.62
1997	2.65	1	4.01	0.61
1998	2.64	1	3.93	0.61
1999	2.64	1	3.87	0.61
2000	2.65	1	3.81	0.61
2001	2.68	1	3.76	0.61
2002	2.69	1	3.69	0.61
2003	2.73	1.00	3.63	0.61
2004	2.78	1.00	3.58	0.61
2005	2.83	1.00	3.53	0.61
2006	2.88	1.00	3.49	0.61
2007	2.93	1	3.43	0.61
2008	2.99	1	3.38	0.61
2009	3.05	1	3.33	0.61
2010	3.11	1	3.28	0.61

Table VII
Contributions as a Percentage of Salary of Active Participants in Social Security System Retirement at Age 60 for men, 55 for women
 (All Amounts in Billions of Pesos)

	1991	1995	2000	2005	2010		
D) Socialist Stasis Scenario							
A. Present Value of Future Benefits							
1. Active Participants		146	152.6	158.7	166.8	174.6	
2. Current Pensioners		24.7	24.9	27.5	30.5	33.5	
3. Total		170.7	177.5	186.2	197.3	208.1	
B. Present Value of Future Salaries			229.3	223.2	216.1	214	213.1
C. Contribution as a Percentage of Salary							
1. For Active Participants		64	68	73	78 percent	82	
Future Benefits		percent	percent	percent		percent	
2. For Current Pensioners		11	11	13	14 percent	< 16	
Future Benefits		percent	percent	percent	/TD>	percent	
3. Total		74	80	86	92 percent	98	
		percent	percent	percent		percent	

II) Caribbean Basin Initiative-Real Scenario

A. Present Value of Future Benefits

1. Active Participants	25.5	29.7	34.3	39.9	46.3
2. Current Pensioners	14.3	14.9	16.7	18.6	21
3. Total	39.8	44.6	51	58.5	67.3

B. Present Value of Future Salaries 116.5 122.2 131.2 145.8 163.5

C. Contribution as a Percentage of Salary

1. For Active Participants Future Benefits	22 percent	24 percent	26 percent	27 percent	28 percent
2. For Current Pensioners Future Benefits	12 percent	12 percent	13 percent	13 percent< /TD>	13 percent
3. Total	34 percent	36 percent	39 percent	40 percent	41 percent

III) Caribbean Basin Initiative-US\$ Nominal Scenario

A. Present Value of Future Benefits

1. Active Participants	19.6	25.5	34	45.4	60.4
2. Current Pensioners	11.7	12.6	14.7	17.7	22.3
3. Total	31.3	38.1	48.7	63.1	82.7

B. Present Value of Future Salaries 117 137.5 170 217.2 280.1

C. Contribution as a Percentage of Salary

1. For Active Participants Future Benefits	17 percent	19 percent	20 percent	21 percent	22 percent
2. For Current Pensioners Future Benefits	10 percent	9 percent	9 percent	8 percent	8 percent
3. Total	27 percent	28 percent	29 percent	29 percent	30 percent

Table VIII

Contributions as a Percentage of Salary of Active Participants in Social Security System Retirement at Age 65 for both men and women

(All Amounts in Billions of Pesos)

1991 1995 2000 2005 2010

I) Socialist Stasis Scenario

A. Present Value of Future Benefits

1. Active Participants	115.6	120.2	123.8	128.5	133
2. Current Pensioners	24.7	19.2	15.4	15.9	18
3. Total	140.3	139.4	139.2	144.4	151

B. Present Value of Future Salaries 281.3 264.7 242.1 237.3 241.3

C. Contribution as a Percentage of Salary

1. For Active Participants	41	45	51	54	55
Future Benefits	percent	percent	percent	percent	percent
2. For Current Pensioners	9	7	6	7	7
Future Benefits	percent	percent	percent	percent	percent
3. Total	50	53	57	61	63
	percent	percent	percent	percent	percent

II) Caribbean Basin Initiative-Real Scenario

A. Present Value of Future Benefits

1. Active Participants	16.6	21.3	27.2	32.2	37
2. Current Pensioners	14.3	11.9	10.1	10.6	12.5
3. Total	30.9	33.2	37.3	42.8	49.5

B. Present Value of Future Salaries 132.7 137 140.9 153.2 172.6

C. Contribution as a Percentage of Salary

1. For Active Participants	13	16	19	21	21
Future Benefits	percent	percent	percent	percent	percent
2. For Current Pensioners	11	9	7	7	7
Future Benefits	percent	percent	percent	percent	percent
3. Total	23	24	26	28	29
	percent	percent	percent	percent	percent

III) Caribbean Basin Initiative-US\$ Nominal Scenario

A. Present Value of Future Benefits

1. Active Participants	13.4	19.1	28.2	38.5	51
2. Current Pensioners	11.7	9.9	8.8	10.3	13.8
3. Total	25.1	29	37	48.8	64.8

B. Present Value of Future Salaries 133.4 154.5 183.2 229.4 297.3

C. Contribution as a Percentage of Salary

1. For Active Participants	10	12	15	17	17
Future Benefits	percent	percent	percent	percent	percent
2. For Current Pensioners	9	6	5	4	5
Future Benefits	percent	percent	percent	percent	percent
3. Total	19	19	20	21	22
	percent	percent	percent	percent	percent

Table IX

Contributions as a Percentage of Salary of Active Participants in Social Security System Retirement at Age 65 and excluding Participants younger than 45 on January 1, 1995
(All Amounts in Billions of Pesos)

1991 1995 2000 2005 2010

I) Socialist Stasis Scenario

A. Present Value of Future Benefits

1. Active Participants	33.2	33.2	30.5	23.2	13.3
2. Current Pensioners	24.7	19.2	15.4	15.9	18
3. Total	57.9	52.4	45.9	39.1	31.3

B. Present Value of Future Salaries 281.3 264.7 242.1 237.3 241.3

C. Contribution as a Percentage of Salary

1. For Active Participants	12	13	13	10	6
Future Benefits	percent	percent	percent	percent	percent
2. For Current Pensioners	9	7	6	7	7
Future Benefits	percent	percent	percent	percent	percent
3. Total	21	20	19	16	13
	percent	percent	percent	percent	percent

II) Caribbean Basin Initiative-Real Scenario

A. Present Value of Future Benefits

1. Active Participants	8.3	10.5	12.3	11.5	8.1
2. Current Pensioners	14.3	11.9	10.1	10.6	12.5
3. Total	22.6	22.4	22.4	22.1	20.6

B. Present Value of Future Salaries 132.7 137 140.9 153.2 172.6

C. Contribution as a Percentage of Salary

1. For Active Participants Future Benefits	6 percent	8 percent	9 percent	8 percent	5 percent
2. For Current Pensioners Future Benefits	11 percent	9 percent	7 percent	7 percent	7 percent
3. Total	17 percent	16 percent	16 percent	14 percent	12 percent

III) Caribbean Basin Initiative-US\$ Nominal Scenario

A. Present Value of Future Benefits

1. Active Participants	6.5	9.2	12.5	13.4	10.8
2. Current Pensioners	11.7	9.9	8.8	10.3	13.8
3. Total	18.2	19.1	21.3	23.7	24.6

B. Present Value of Future Salaries 133.4 154.5 183.2 229.4 297.3

C. Contribution as a Percentage of Salary

1. For Active Participants Future Benefits	5 percent	6 percent	7 percent	6 percent	4 percent
2. For Current Pensioners Future Benefits	9 percent	6 percent	5 percent	4 percent	5 percent
3. Total	14 percent	12 percent	12 percent	10 percent	8 percent

Table X

Total Pensions as a Percentage of Total Salaries for Selected Years

Retirement at Age 65 for both Men and Women

(All Amounts in Billions of Pesos)

1991 1995 2000 2005 2010

I) Socialist Stasis Scenario

A, Total Pensions	1397	1325	1333	1507	1712
B. Total Salaries	7765	8668	9267	9299	9237
C. Pensions as a Percentage of Salaries	18 percent	15 percent	14 percent	16 percent	19 percent

II) Caribbean Basin Initiative-Real Scenario

A, Total Pensions	1397	1325	1333	1515	1767
B. Total Salaries	7765	8668	9332	9851	10963
C. Pensions as a Percentage of Salaries	18 percent	15 percent	14 percent	15 percent	16 percent

III Caribbean Basin Initiative-US\$ Nominal Scenario

A, Total Pensions	1397	1325	1367	1708	2279
B. Total Salaries	7765	9752	12162	14834	19025
C. Pensions as a Percentage of Salaries	18 percent	14 percent	11 percent	12 percent	12 percent