CYPRUS

Technical note

Actuarial valuation of the pension plan of the Human Resource Development Authority of Cyprus as of 31 December 2003

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Contents

Executive summary

The present report presents the situation of the pension plan of the Human Resource Development Authority (HRDA) as at 31 December 2003.

Under the present financial arrangement, the employer pays a contribution rate of 21.0 per cent of the payroll and the employees pay an average of 0.8 per cent of their salary (0.75 per cent up to the social security ceiling and 1.75 per cent above the ceiling). According to the actuarial projections of the present valuation, the required contribution rate that spreads the cost of the projected benefits over the future active lifetime of the present plan members is 26.7 per cent. The important increase of the cost of the plan between the last valuation and the present one is due to the effect of three main factors: the low rate of return of the pension fund in 2002 and 2003, the growth of salaries over the last three years which was significantly higher than assumed, and the retirement of three members before the age of 55. The present contribution rate is thus considered insufficient for an adequate financing of the plan.

It is recommended to increase the employer's contribution rate from 21.0 per cent to 25.0 per cent of the pensionable earnings for the next three years and to keep unchanged the contribution rate of the employees. This recommended contribution rate is lower than the full cost as determined under the base scenario. However,

i) an important part of the increase of cost is due to one case of early retirement under special conditions that should not reappear in the future, and

ii) simulations show that the cost of the scheme is very sensitive to two economic assumptions: the salary growth and the rate of return of the fund (see Section 2.4). It would be undesirable that the contribution rate fluctuate too much between actuarial valuations given the uncertainty regarding the future behaviour of those variables.

The results of the next actuarial valuation will provide an indication on the sufficiency of that contribution rate over the long term.

In addition to the base valuation, the actuary has been asked to measure the effect of increasing the retirement age from 60 to 63. With an increase in retirement age, two options are presented regarding the determination of the pension:

1. Under scenario 1, the present pension formula would not be changed, so that the Social Insurance offset would continue to apply from age 63.

2. Under scenario 2, the Social Insurance offset would no longer apply; the HRDA pension would thereafter be payable in addition to the Social Insurance pension, with no reduction of the pension at age 63.

Under scenario 1, the cost of the HRDA pension plan would decrease from 26.7 per cent to 16.1 per cent. Under scenario 2, the cost of the plan would increase from 26.7 per cent to 40.2 per cent.

The assets of the plan are presently deposited for the most part with commercial banks. The interest rate credited to these bank accounts has decreased significantly since the last actuarial review. A new investment policy should be considered by the HRDA.

Introduction

This actuarial valuation has been prepared following an agreement between the Human Resource Development Authority (HRDA) of Cyprus and the International Labour Office (ILO). The ILO assigned Mr. Pierre Plamondon, external actuary of the Financial, Actuarial and Statistical Services Branch of the ILO, to carry out the valuation. Mr. Plamondon was in Cyprus in April 2004 to collect the data required for the valuation and to discuss the terms of reference of the valuation with the management of the HRDA.

The purpose of the valuation is to assess the financial standing of the HRDA pension plan and to estimate the required contributions to the fund as a percentage of the employees' pensionable emoluments (basic salary plus cost of living allowance). The valuation takes into account the integration of the HRDA pension plan with the Social Insurance Scheme of Cyprus.

The actuary is grateful for the excellent support received during his stay in Cyprus from Mr. Michael Fysentzides, Director General of the HRDA, Mr. Spyros Spyrou, Director of the Financial Services Directorate, and Ms. Chrystalla Elia Hadjiandreou, Accounting Officer.

1. Financial results of the pension plan for the period 2001-2003

1.1. Revenue and expenditure of the plan

The revenue and expenditure of the plan for the period 2001-2003 are presented in Table 1. It must be noted that the amount of the employer's contributions for 2001 includes an amount of £285 500 representing half of the deficit identified in the valuation as at 31 December 1997. In addition, the employer's contributions for 2003 include an amount of £145 229 corresponding to the difference between contributions at the rates of 15 per cent and 21 per cent (as recommended in the last actuarial valuation) that has been paid entirely in 2003.

Table 1. Revenue and expenditure of the HRDA pension plan for the period 2001-2003 (in £)

	2001	2002	2003
Fund at 1 January	2 652 021	3 219 478	3 514 036
Receipts			
➢ Employer's contributions	463 386	191 452	426 399
➢ Employees' contributions (for death benefits)	9 859	10 961	11 591
➢ Interest	189 130	171 802	158 512
➢ Other receipts	-	-	3 724
Expenditures			
➢ Pensions and gratuities	89 297	65 181	137 348
➢ National Defence Fund on interest received	5 621	14 476	15 847
➢ Other expenses	-	-	3 784
Fund at 31 December	3 219 478	3 514 036	3 957 283

1.2. Assets and rate of return of the fund

The main proportion of the assets of the plan is deposited with commercial banks, as illustrated in Table 2. Seven per cent of the plan's assets are used to grant housing loans to HRDA employees. The interest rate charged to employees on these housing loans is the same as the average interest rate earned by the fund on its other assets.

Table 2. Composition of the assets of the HRDA pension plan as of 31 December 2003

Type of asset	Amount (£)
Deposits in Bank of Cyprus Ltd	1 027 182
Deposits in Cyprus Popular Bank Ltd	599 058
Deposits in Hellenic Bank Ltd	967 460
Deposits in National Bank of Greece (Cyprus) Ltd	1 092 672
Housing loans to employees	272 154
Amount due to HRDA creditors	(1 243)
Total	3 957 283

The general reduction of interest rates in Cyprus over the last two years has directly affected the rate of return of the HRDA pension fund. As shown in Table 3, the average rate of return has decreased from 6.7 per cent in 2001 to 5.2 per cent in 2002 and 4.3 per cent in 2003.

Table 3. Rate of return of the HRDA pension fund (1999-2003)

Year	**Average return** (%)
1999	6.5
2000	6.5
2001	6.7
2002	5.2
2003	4.3

2. Results of the actuarial valuation

This chapter presents the results of the actuarial valuation. The required contribution rate of the plan is first calculated under present provisions and based on the assumptions described in Annex 3. Alternative costs are then determined based on different assumptions with respect to the rate of salary increase and the rate of return on the plan's assets, these being the two most sensitive assumptions. Finally, the chapter presents the effect on the required contribution rate of raising the retirement age from 60 to 63.

The valuation is based on data (summarised in Annex 2) obtained from the Human Resource Development Authority.

2.1. Integration with the Social Insurance Scheme

The HRDA pension is integrated with the Cyprus Social Insurance Scheme (SIS). From the age of 63, the HRDA pension is directly reduced by the amount of the supplementary (upper band) pension paid by the SIS.

The pension formula of the HRDA pension plan is very similar to the formula of the Social Insurance Scheme. Under the Social Insurance Scheme, the old age pension is calculated as 1.5 per cent of the total indexed earnings in the upper band, while under the HRDA pension plan, the pension is equal to the final salary multiplied by the number of months of service divided by 800 (or, in other words, the final salary multiplied by the number of years of service times 1.5 per cent). However, several factors make the cost of the HRDA pension plan still positive despite the integration with the Social Insurance Scheme:

1. the salary of a certain number of employees of the HRDA is higher than the maximum insurable earnings under the Social Insurance Scheme;

2. the basic (lower band) pension received from the Social Insurance Scheme is not offset against the HRDA pension, while the HRDA pension is calculated on the total salary;

3. salaries of the staff of the HRDA generally increase faster than the maximum insurable earnings of the Social Insurance Scheme. Under the HRDA pension formula, each year of service has the same weight, while under the Social Insurance Scheme the number of points earned in the upper band for a given year is frozen once earned. Hence for those employees earning less than the SIS ceiling, if the earnings of the individual increase at a faster rate than the SIS ceiling, the early years of participation in the SIS have a lesser weight than the years just preceding retirement;

4. the Social Insurance pension starts three years later than the HRDA pension. The retirement age of the HRDA pension plan is 60, compared to 63 for most SIS insured persons.

2.2. Cost of the HRDA pension plan under present provisions

We have performed a first cost estimate using the same actuarial assumptions as those used in the last actuarial review. Under present provisions and the actuarial assumptions described in Annex 3, the cost of the HRDA pension plan is determined as presented in

Table 4. The cost of the plan on this basis is estimated at 26.7 per cent of salaries. This rate must be compared to the present contribution rate of the plan established at 21.8 per cent, composed of the employer's contribution (21.0 per cent) plus the contribution of employees representing approximately 0.8 per cent of earnings (0.75 per cent of the earnings up to the SIS ceiling and 1.75 per cent of the earnings over that ceiling).

Table 4. Calculation of the required contribution rate under present provisions (£)

Present value of retirement pensions	5 689 075
Present value of retirement gratuities	2 916 131
Present value of death benefits before retirement[1]	37 157
Present value of invalidity benefits[1]	64 811
Present value of pensions in payment on the valuation date	742 572
(minus)	
Value of assets on the valuation date	(3 957 283)
Total liability to be amortized over the future working lifetime of the present employees	5 492 463
Present value of future salaries of the present employees	20 595 986
Required contribution rate (as a percentage of pensionable earnings)	26.7%

[1] It must be noted that the value of death and invalidity benefits are very low because the SIS grants credits for the total future period until the age of 63 in the calculation of survivors and invalidity pensions. In most cases of death or invalidity before retirement, the cost to the HRDA pension plan is then totally offset by the SIS pension, since the HRDA pension plan does not recognise those years in its pension calculations.

The actuarial cost method applied for the valuation does not reveal actuarial surpluses or deficits as such, since any unfunded liability at the time of a valuation is amortized automatically over the future active lifetime of the present population of plan members. However, the difference between the present combined contribution rate of 21.8 per cent and the actual cost of the plan of 26.7 per cent will have to be absorbed in one way or another.

2.3. Reconciliation with the last valuation

The difference between the plan's costs as determined under the present actuarial valuation versus the preceding one is caused by the following factors:

1. the rate of return of the fund over the last two years has been lower than what was assumed in the last valuation (5.2 per cent in 2002 and 4.3 per cent in 2003 compared to an assumption of 6.5 per cent), thus decreasing the initial reserve as of 31 December 2003. As regards the future, the rate of return assumption of the present valuation is 6.0 per cent compared to 6.5 per cent in the last valuation;

2. the average salary increases of the employees of the HRDA have averaged 10 per cent over the last three years, compared to an assumption of 7 per cent, thus pushing upward the amount of the projected retirement pensions,

3. three employees have retired before the age of 55 (compared to an assumed retirement age of 60). Even if the pension will start only at the age of 55 for two of them, another member had the right to receive an immediate pension from age 52 due to special provisions applicable to public duties.

2.4. Sensitivity to critical economic assumptions

Two economic assumptions are critical to the results of the valuation: the rate of increase of salaries and the rate of return of the fund. In the base valuation, the assumed rate of return is 6.0 per cent per year and the rate of increase of salaries is 7.0 per cent below the Social Insurance earnings ceiling and 5.0 per cent above the ceiling.

Sensitivity tests have been performed on these two variables and results appear in Table 5. In a series of tests, we have reduced the rate of increase of salaries to be in line with the assumption used in the actuarial valuation of the Social Insurance Scheme, thus assuming that the HRDA employees would receive in the future the same salary increases as the average worker in Cyprus. In a second series of tests, we have modified the rate of return of the fund (6.5 per cent, 5.5 per cent and 5.0 per cent) as compared to the base assumption of 6.0 per cent.

Table 5. Results of the sensitivity tests

	Rate of increase of salaries	Rate of return of the fund (%)	Cost of the plan (%)
Base scenario	7.0% below the ceiling and 5.0% above	6.0	26.7
Test I	5.0%	6.0	20.6
Test II	7.0% below the ceiling and 5.0% above	6.5	25.2
Test III	5.0%	6.5	19.3
Test IV	7.0% below the ceiling and 5.0% above	5.5	28.4
Test V	5.0%	5.5	22.2
Test VI	7.0% below the ceiling and 5.0% above	5.0	29.9
Test VII	5.0%	5.0	23.5

2.5. Effect of an increase of the retirement age

Under the terms of reference of the valuation, a request was made to estimate the effect of an increase of the normal retirement age on the cost of the plan. Two scenarios have been studied:

Scenario 1: Increase of the retirement age from 60 to 63 with the continuation of the present provisions of the scheme, notably the reduction of the HRDA pension at 63 by the amount of the Social Insurance supplementary pension.

Scenario 2: Increase of the retirement age from 60 to 63 and payment of the HRDA pension in addition to the Social Insurance pension, with no reduction applicable.

Under scenario 1, the cost of the plan would be reduced from 26.7 per cent to 16.1 per cent. The reduction of the cost under that scenario results from a combination of factors:

— An important part of the cost of the present scheme is related to pensions that are paid by the HRDA pension plan between the ages of 60 and 63 (before the reduction by the Social Insurance pension); removing that portion of the pension payment period reduces significantly the cost of the plan;

— Participating three more years to the HRDA pension plan creates an increase in the number of years of service and an increase in the final salary used for the determination of the HRDA pension (increased costs);

— Contributing three more years to the Social Insurance Scheme increases the SIS pension; the Social Insurance offset applicable from age 63 is thus more important (reduced costs).

Under scenario 2, the cost of the plan would increase from 26.7 per cent to 40.2 per cent. This reflects the substantial impact of the integration of the HRDA pension plan with the Social Insurance Scheme under the present provisions.

2.6. Recommended contribution rates

Considering the cost of the plan under the base scenario and the sensitivity tests performed on some key economic assumptions, it is recommended to increase the employer's contribution rate from 21.0 per cent to 25.0 per cent from 1 January 2004 and to keep unchanged the contribution rate paid by the employees. This recommended contribution rate is lower than full cost as determined under the base scenario. However,

i) an important factor in the increased cost is due to one case of early retirement under special conditions that should not reappear in the future, and

ii) simulations show that the cost of the scheme is very sensitive to two economic assumptions: salary growth and the rate of return of the fund (see Section 2.4). It would be undesirable that the contribution rate fluctuate too much between actuarial valuations given the uncertainty regarding the future behaviour of those variables.

The results of the next actuarial valuation will provide indications on the sufficiency of that contribution rate in the long term, given the evolution of salaries and the rate of return of the fund over the next three years.

2.7. Investment policy

The recent liberalisation of interest rates in Cyprus calls for a change in the investment strategy of the HRDA pension plan. The high rates of return experienced before 2002 by the pension fund cannot be replicated in the future if the totality of the assets continues to be invested in commercial bank accounts, as demonstrated by the recent liberalization and decrease of interest rates in Cyprus. It is thus recommended to gradually diversify the investment portfolio so that the return on the plan's assets is not totally dependent on variations of the commercial banks' interest rates.

One option would be to look at the possibility of investing in long-term fixed-income securities that would guarantee an adequate return for an extended period of time. Since the pension plan is not expected to have liquidity needs in the short-run, long-term bonds or debentures would be appropriate for that purpose.

Another way to diversify the portfolio would be to invest in equity. The stock market in Cyprus, however, has been very volatile in the past. It has not demonstrated stability and reliability and prudence is the rule with regard to this type of investment. To avoid the high risk associated with the Cyprus stock market, part of the pension assets could be invested in international funds that would normally benefit from long-term growth and would, at the same time, diversify the risk of the portfolio. It is recommended that the HRDA use the expertise of investment specialists to establish a suitable and prudent investment policy based on the above general guidelines.

Annex 1. Summary description of the HRDA pension plan

The pension plan operated by the Human Resource Development Authority of Cyprus for its permanent employees is identical to the Government Employees Pension Plan. The HRDA pension plan is integrated with the Social Insurance Scheme of Cyprus. The amount of the supplementary pension received from the Social Insurance Scheme that was earned after October 1980 (the upper band pension) is deducted from the pension paid by the HRDA pension plan.

A1. Contributions

The HRDA presently pays to the pension fund a contribution equal to 21 per cent of the pensionable emoluments (basic salaries plus cost of living allowance).[1] The pensionable emoluments used for the calculation of contributions exclude the 13th salary payment received by the employee at the end of the year.

For the purpose of transferring the pension to the widow and/or children in case of death, employees pay to the plan 0.75 per cent of their annual pensionable emoluments, up to the maximum insurable earnings, and 1.75 per cent for emoluments exceeding the maximum insurable earnings.

A2. Benefits

A2.1. Retirement

The normal retirement age is 60. However, an employee may ask to retire at any time after reaching the age of 55. Upon his retirement, an employee is entitled to receive a pension and a gratuity (lump sum) calculated as follows:

$$\text{Annual pension} = \frac{\text{Annual pensionable emoluments at the time of retirement} \times \text{Number of months of service (maximum 400)}}{800}$$

$$\text{Gratuity} = \frac{\text{Annual pension} \times 14}{3}$$

The monthly pension is equal to 1/12 of the annual pension calculated according to the above formula and is paid 13 times a year.

In determining the number of months of service in the pension formula, the plan may recognize service accomplished before 1981 for another public service employer, if the member has asked for a transfer of his/her rights from the former pension plan. Regarding those cases, the Government Employees Pension Plan has already paid to the HRDA pension plan an amount equal to the gratuity at resignation (see A.2.5 below). An amount

[1] In addition, contributions amounting to 16.6 per cent are paid to the Social Insurance Scheme (i.e. 9.4 per cent by the HRDA, 3.2 per cent by the employees and 4.0 per cent by the Government)

calculated according to the same formula is paid by the HRDA if an employee is transferred from the HRDA to another public service employer.

An employee may ask for early retirement at any time after reaching the age of 45 and before the age of 55. In this case, the employee is entitled to receive immediately only the gratuity calculated as above. The amount of the annual pension is frozen and paid from the age of 55.

A2.2. Death

The following pensions are paid following the death of a member:

- Widow: 75 per cent of the pension of the employee/pensioner on the date of death, taking into account the special credits described in A.2.4.
- Children: 16.67 per cent of the pension per children, with maximum of two children.

A2.3. Invalidity

For retirement due to health reasons, the member is entitled to receive a lifetime pension calculated according to the age retirement formula, taking into account the special credits described in A.2.4.

A2.4. Special credits

In calculating the amount of the pension in the event of death or invalidity, the employee's pensionable service on the date of death or invalidity is increased as follows:

- Employee with five or more years but less than ten years of service: The pensionable service is doubled.
- Employee with ten or more years but less than fifteen years of service: The pensionable service is increased to twenty.
- Employee with fifteen or more years but less than twenty-three years of service: The pensionable service is increased by five years with maximum 25 years.
- Employee with twenty-three or more years but less than thirty years of service: The pensionable service is increased by two years with maximum 30 years.

The pensionable service calculated above should not exceed the service that employee would have if he/she had retired at the compulsory age of retirement.

A2.5. Resignation

Upon resignation, an employee, with a service of 3 years or more and under the age of 45, is only entitled to receive a gratuity calculated as follows:

$$\text{Gratuity} = \frac{\text{Monthly pensionable emoluments at the time of resignation} \times \text{Number of months of service}}{12}$$

A2.6. Cost of living adjustment

Pensions are subject to revision every 1st January and 1st July in accordance with cost of living fluctuations.

A2.7. Integration with the Social Insurance Scheme

The amount of the HRDA pension, in case of retirement, death or disability, is reduced by the corresponding supplementary (upper band) pension paid by the Social Insurance Scheme. The upper band pension under the Social Insurance Scheme was introduced on 6 October 1980.

Under the Social Insurance Scheme, the retirement pension is equal to 1.5 per cent of the number of « points » earned in the upper band times the amount of the basic insurable earnings at the time of retirement. The number of points earned in a given year is equal to the actual earnings of the workers, limited to the upper band ceiling, divided by the amount of the basic insurable earnings of the following year. The retirement age is 63 for persons who had weekly average insurable earnings at least equal to 70 per cent of the weekly amount of basic earnings.

In case of death, the Social Insurance Scheme pays to the widow a pension equal to 60 per cent of the upper band pension which was paid (for death after retirement) or would have been payable (for death before retirement) to the deceased person. In the case of invalidity, the Social Insurance Scheme pays a pension equal to the upper band retirement pension. In calculating the amount of the pension in case of death (or invalidity) before the age of 63, the Social Insurance Scheme includes in the pensionable service the period of time between the date of death (or invalidity) and the age of 63. The earnings to be credited for that period are the average insurable earnings in the upper band for the last five years.

Annex 2. Database for the valuation

A2.1. Active members

Seventy-six permanent employees of the HRDA were participating in the pension plan on 31 December 2003. The participants and their earnings were broken down by age as presented in Table A.2.1.

Table A.2.1. Distribution of active members and their annual payroll in 2003

Age	Number	Total annual payroll (£)
20-24	3	20 218
25-29	11	106 650
30-34	5	55 556
35-39	9	129 291
40-44	9	149 811
45-49	20	410 269
50-54	12	285 025
55-59	7	177 179
Total	76	1 333 999

A2.2. Pensions in payment

Pensions in payment as at 31 December 2003 are described in Table A.2.2.

Table A.2.2. Pensioners on 31 December 2003

Age of the pensioner	Sex	Amount of the annual rate of pension paid in 2003 (£)
70	F	1 599
72	F	4 078
65	M	14 076
65	F	3 365
62	F	2 385
62	M	6 586
60	F	6 058
48 (1)	M	6 270
47 (1)	F	6 467
52 (2)	M	13 705
Total		51 852

(1) These two pensioners will start receive their pension at the age of 55.

(2) This pensioner benefits from a special provision of the law and is entitled to an immediate pension before the age of 55.

Annex 3. Methodology and assumptions

A3.1. Methodology

The valuation has been performed under a closed group basis taking into account the actual membership as at 31 December 2003.

The required contribution rate is determined using a cost method that spreads the excess of the value of promised benefits over the present assets of the plan, over the future active lifetime of the present members of the plan. The contribution rate is determined as follows.

$$CR = \frac{PVPB - Fund}{PVFS}$$

Where:

CR	=	Contribution rate
PVPB	=	Present value of projected benefits of active members on the valuation date, plus the present value of the pensions in payment on the valuation date
PVFS	=	Present value of future salaries of present members
Fund	=	Assets of the plan on the valuation date

By definition, this cost method does not reveal any surplus or a deficit on a valuation date since the differences in experience or assumptions since the previous valuation are automatically spread over the future active lifetime of the plan members. Those differences are reflected in the variation of the required contribution rate from one valuation to the next.

A3.2. Assumptions

A3.2.1. Mortality rates

Mortality rates for active members, invalid, retired members and survivors were assumed equal to the rates used for the actuarial valuation of the Social Insurance Scheme of Cyprus as of 31 December 2003. Sample mortality rates are presented in Table A.3.1.

Table A.3.1. Sample mortality rates

Age	Males	Females
22	.00090	.00032
27	.00102	.00040
32	.00095	.00049
37	.00116	.00070
42	.00183	.00109
47	.00289	.00171
52	.00507	.00270
57	.00742	.00394
62	.01183	.00620

A3.2.2. Rates of incidence of invalidity

Rates of incidence of invalidity for active members were taken from the actuarial valuation of the Social Insurance of Cyprus as of 31 December 2003. Sample rates are presented in Table A.3.2.

Table A.3.2. Sample invalidity incidence rates

Age	Males	Females
22	0.00027	0.00003
27	0.00049	0.00013
32	0.00051	0.00014
37	0.00102	0.00049
42	0.00175	0.00115
47	0.00250	0.00184
52	0.00494	0.00424
57	0.00916	0.00797

A3.2.3. Retirement age

Under the base scenario, all members are assumed to retire at age 60 under the HRDA pension plan and to receive their Social Insurance old age pension from the age of 63.

A3.2.4. Inflation

The rate of inflation has been assumed constant at 2 per cent for the whole projection period.

A3.2.5. *Rate of increase of the Social Insurance ceiling*

The ceiling on insurable earnings under the Social Insurance Scheme of Cyprus is assumed to grow at a constant rate of 5.0 per cent for the whole projection period.

A3.2.6. *Rate of increase of the salaries of HRDA employees*

It has been observed over the last 20 years of existence of the HRDA pension plan that the salaries of members have increased faster than the Social Security ceiling. This is due to the application of a remuneration system whereby employees obtain salary increases based on years of experience, in addition to COLA adjustments. Employment promotions also contribute to salary increases exceeding the general salary increases observed in Cyprus. For the present valuation to reflect that reality, it is assumed that the rate of salary increase is higher during the early years of the career, until the person's salary reaches the Social Security ceiling.

Salaries of active members are assumed to grow at a rate of 7.0 per cent until they reach the Social Security ceiling on insurable earnings. Once they reach the Social Security ceiling, their salary is assumed to grow at a rate of 5.0 per cent.

A3.2.7. *Rate of return on plan's assets*

The rate of return on the plan's assets is assumed constant at 6.0 per cent per year. Considering the liberalisation of interest rates in Cyprus and the probable future decrease of general interest rates, it is assumed that the HRDA will adapt its future investment policy if returns obtained on bank deposits decrease significantly, so as to maintain the expected return.