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**Romania's Pension System:  
The Weight of the Past**

*W a r s a w , 1 9 9 9*

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## **I. Introduction**

In Romania before 1989, as elsewhere in the Soviet world, retirement support was one of the few rewards that the regime offered its citizens. Retirement provisions were based exclusively transfers, through the State, from the current working population to the pensioners. Technically, the system was a Pay As You Go System. The difference was that retirement provisions, like every other facet of the economy, were planned. Workers did not choose, but were told, when to retire. Early retirement was not envisioned. Sick leave was strictly controlled and limited. There was no unemployment, and the penalties for any enterprise which evaded payments to the system were prohibitive (The State Bank was simply prohibited from paying wages until wage taxes had been paid). Transfers in cash and kind to the pensioners were strictly limited to the resources available.

As a consequence, before 1989, Romania's retirement system can be considered to have been consistently in excess.

In the years which followed the overthrow of Nicolae Ceausescu, the public retirement system lost the constraints imposed by a command economy, and its implicit tensions became manifest. As the dispersion of wages increased under the pressure of even proto-market forces, disparities between benefits and contributions appeared, and the pressure for tax evasion grew. Tax discipline deteriorated.

Furthermore, the new Government extended the pension system it had inherited, increasing the benefits and relaxing the qualifications, in response to political pressures.

The result was that the system became fiscally imbalanced, and that, paradoxically, though privileges multiplied, actual average benefits declined. By 1997, the public pension system was in deficit, and the average real benefit had fallen to 45 % of its level in 1990. In 1998, Romania began an ambitious reform of its pension system, and proceed with a plan to introduce by stages a completely new three-pillar system. The form entailed a radical change of the public pension system (including the transition to a "point" system, unification of regimes, and increases in retirement ages), and a diversion of one third of the mandatory social security tax to a new private system of Universal Pension Funds.

This paper presents and analyses the weight of the past. It describes the institutional weaknesses of the pre-reform system and analyses the demographic pressures

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threatening it. It concludes with a calculation of the implicit debt of the pre-reform system in 1997.

## **2. The Demographic Evolution**

Surveys carried out by the National Commission for Statistics indicate that the population of Romania diminished by 154 thousand persons during the period 1992–1995. This trend is likely to continue, due to the low level of fertility (1.2 children per married couple and less than 1.4 children per woman in 1994), to the high rate of mortality and to the negative balance of foreign migration.

Life expectancy in 1998 was 65.8 years for men and 73.4 years for women, which is 6–7 years lower than in western European countries.

A slow, but constant population aging is becoming manifest. It started later than in other countries, but is felt with a higher intensity in Romania. The effects of such process are reflected in the demographic dependency ratio (number of young and elderly persons per adult person), which diminished by 59 young persons for 1,000 adults, from 1990 to 1995, and increased by 23 elder persons to 1,000 adult persons in the same period.

As the rates of birth and fertility continue to be low and existing generations grow old, the population structure per large groups of age will significantly change, in the sense that the number and share of young people will diminish and the number and share of adult and elderly persons will increase.

A continuous growth in the number of the population aged over 65 is anticipated, its number reaching over 4.1 million in the year 2020 (19.9% of the total population), as compared to only 2.7 million in 1995 (see Table 1).

It is estimated that the average number of persons employed in industrial activities will diminish by an average annual rate of 2.1% in the period remaining until the year 2000, and 2.6 during the following years.

On the assumption that Romania tends to move towards West European patterns, we make the following long term demographic hypotheses (2000–2040):

- after reaching a low of 1.3, the number of children per woman will increase slowly to 1.7;
- life expectancy will increase to about 80 years for women and 73 years for men.

Table 1.

Population per large age groups	1985		1990		1995		2000		2010		2020	
	Thd. persons	%	Thd. persons	%	Thd. persons	%	Thd. persons	%	Thd. persons	%	Thd. persons	%
TOTAL	22.72	100	23.207	100	22.694	100	22.493	100	21.972	100	21.572	100
0-4 years	5.318	23.4	5.469	23.6	4.677	20.6	4.201	18.7	3.776	17.2	3.396	15.7
15-64 years	15.317	67.4	15.324	66.0	15.299	67.4	15.327	68.1	14.548	66.2	14.048	65.1
65 years and over	2.090	9.2	2.414	10.4	2.718	12.0	2.966	13.2	3.647	16.6	4.130	19.1

### **3. Legal Characteristics of the Pre-reform, 1998 Pension System**

In accordance with the legislation in effect in 1998, several types of social insurance systems functioned in Romania, all of them of a re-distributive type, based on the "pay-as-you-go" principle, mostly functioning on the basis of regulations regarding State social insurance.

Social insurance is generally based on the existence of an employment agreement and on payment of social insurance contributions by the legal employer. An additional pension is also regulated, based on contributions paid by employees.

The social insurance and pension system in force in Romania in 1998 was characterized ever since 1992 by a high degree of diversification, due to the existence of more than six independent systems, each for different sectors of activity or professions. In addition to the state social insurance system, the ones of the farmers and of the military, there were also smaller systems, such as the ones of the handicraftsmen, of the clergy, of artists and of lawyers.

The existence of several social insurance systems can exert a negative influence on labor mobility, leading to the concentration of employment in sectors that provide better conditions and/or higher benefits.

These smaller social insurance systems, organized by occupational groups, but also based on the redistribution system, did not succeed to create the financial resources necessary to assure payment of the due benefits, because of the low and diminishing number of active persons paying social insurance contributions.

This was the reason why, during the period 1992–1995, the social insurance systems of the artists (writers, painters, musicians and film makers), of the Romanian Orthodox Church, of the Armenian-Gregorian Church and of handicraftsmen were integrated into the State social insurance system.

The parallel existence of two different pension systems, i.e. base pension and supplementary pension, both of the same re-distributive type, addressed to the same categories of persons and only differentiated by the contribution source, was another anomaly typical of the Romanian social insurance system in effect in 1998.

The supplementary pension system, which is a PAYG system gathering all employees who pay an additional contribution of 3% of their base salary and fringe benefits reached its maturity in 1998. It is worth mentioning the fact that the supplementary pension system was created in 1968 and the payments began in 1973. The law provides that progressively higher benefits will be paid to retirees who have contributed between 5 and



25 years. A five year work history entitle the beneficiary to a supplementary pension representing 8% of his average monthly wage in the best 5 years from the last 10 years of activity and a work history of 25 years or more to 16% of the above average monthly wage. The increase of the replacement rate that is built into the system led, when it had achieved, to the financial imbalance.

## **4. Main Difficulties of the Pre-reform Pension System**

### **4.1. Diminishing Degree of Coverage**

The decline of the degree of coverage of the current pension system, due to the declining number of contribution payers, led to a high number of active persons remaining outside the social insurance system. Thus, for an active population of about 10.8 million persons, at the end of 1998 only about 5 million (46% of the active population) were covered by the social insurance system.

The following are the main causes of this process:

- the increase in the number of persons who work in agriculture or carry out independent activities, work in family associations or based on civil agreements, for which no social insurance contributions are paid;
- the expansion of "black labor" (the estimations of the National Commission for Statistics indicate that about 2 million persons carried out their activities on a semi-formal basis); emigration to the informal sector was stimulated by the high degree of fiscality and by the relatively mild penalties for fiscal evasion;
- company restructuring, which leads to downsizing and the dismissal of persons who are either included in the unemployment benefit and social support granting system or who migrate to the agricultural sector, where no social insurance contribution is paid for them.

The evolution of unemployment is directly influenced by the progress of reform. A firm application of economic restructuring program will tend to lead to structural and long-term unemployment. This tendency will be influenced by the general evolution of national economy.

An examination of the evolution of the unemployment rate (Figure 1) suggests a significant increase in the number of the unemployed in the immediate future, the estimated number of unemployed being 1.05 million persons (11.5% of the active population) in the year 2000. The increase in the number of unemployed directly reduces the number of contribution payers in the social insurance system.

**Figure 1. Evolution of the Unemployment Rate: 1991–1998**



Here are some of the effects of the diminishing of the degree of coverage of the social insurance system:

- a financial imbalance in the social insurance system;
- the diminishing of the real value of social services provided, due to the fact that none of the social protection measures adopted after 1990 were adjusted 100% to the rise in prices;
- a rising burden for the State budget from the continuous increase of subsidies necessary to support the growing number of low-income elderly persons.

## 4.2. Increasing Number of Pensioners

In 1998, the Romanian State social insurance system was confronted with major difficulties, mainly due to the increase in the number of pensioners and the scarcity of the resources needed, to provide an adequate level of replacement of incomes gained during active life.

A reality currently confronting the social insurance system is the fact that currently, and most likely in the future as well, pension is the only certain income for most elderly persons.

At the end of 1998 there were 3,923,723 pensioned persons (excluding farmers and self-employed persons) [1] included in the State social insurance system, 1,768,894 more

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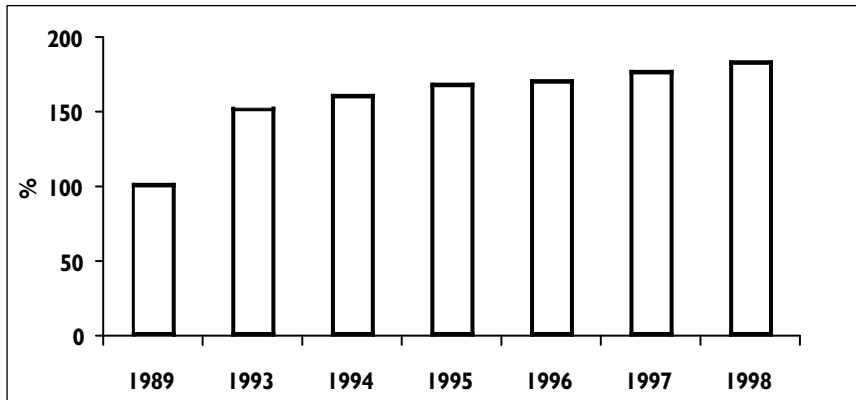
[1] In the pre-reform system, farmers are covered separately. See Section 4.8. Self-employed persons who are not farmers were not covered at all prior to 1997, and only in insignificant numbers subsequently.

**Table 2. Evolution of the number of pensioners (excluding farmers) per category: 1990–1998**

Pensioners Category	Number of Pensioners (1000 persons)								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
Full pension – full length of service	1.160	1.521	1.583	1.599	1.674	1.750	1.769	1.856	1.950
Full pension – incomplete length of service	699	758	793	766	806	818	819	824	825
Pensioners – I-st degree of invalidity	15	15	17	18	20	21	22	23	24
Pensioners – II-nd degree of invalidity	190	192	217	250	303	349	373	388	416
Pensioners – III-rd degree of invalidity	3	15	29	39	51	63	71	80	84
TOTAL PENSIONERS FOR INVALIDITY	208	222	263	307	374	433	466	491	524
Survivor pensions	503	517	562	581	585	599	597	611	624
TOTAL STATE SOCIAL INSURANCE PENSIONERS	2.570	3.018	3.201	3.253	3.439	3.600	3.651	3.782	3.923

than on December 31, 1989, which represents an increase of 82.08% (see Figure 2 and Table 2).

**Figure 2. Evolution of the number of pensioners (excluding farmers): 1989–1998 (expressed as an index; 1989=100)**



This evolution has the following main causes:

a) The adopting of certain regulations regarding early retirement, in particular Decree Law No. 60/1990 and Law No. 2/1995 (which led to the emergence, in only a few months of the year 1990, of about 400,000 new pensioners and consequently to the reduction by the same figure of the number of payers of contributions to the pension system).

b) The doubling of the number of invalidity pensioners between 1990 and 1998. Thus, there were 208,000 invalidity pensioners on December 31, 1990, and at the end of 1998 their number reached 524,265. The average of new yearly entries doubled during this period, rising from 50,000 new cases yearly to over 100,000. Such process was influenced, on the one hand, by a certain easiness in granting invalidity pensions of various degrees and, on the other hand, by the attempt of some persons, possibly dismissed from their companies, to find a relatively certain income, for a longer period of time, to replace unemployment benefits.

c) The integration of an exaggeratedly high number of activities, jobs and professional categories into high difficulty work groups (I and II), which lead to a diminishing of the retirement age by six, respectively three months, for one year of activity in the I-st, respectively II-nd difficulty work group. About 316 thousand persons were integrated into high difficulty work groups on December 31, 1989, while there were over 3.5 million in this category in 1998. Experience showed that

the support intended by the law makers was far exceeded by certain specific dispositions and especially by their extremely permissive character. There are several industrial branches (such as: extraction, building, petrochemical, transporting industry) where almost all activities are deemed to be carried out under "difficult, noxious or hazardous conditions".

The result of all of this is that, in 1998, the average effective retirement age was 54 for men and 50 for women, much below the legislated standard age, which is 60 for men and 55 for women. The situation, per category, was the following (see Table 3).

The reduction of the number of employees to about five million, from about eight million on December 31, 1989, led to a decline in the ratio of contributors to beneficiaries in the system, from 3.6/1 in 1989 to 1.31/1 in 1998. At a global pension system level (also including the farmers' pension system) this rate diminished to below 1/1 in 1997. Based on the analysis of predictable tendencies, the same indicator would continue to go down, if the 1998 regulations were not changed.

### **4.3. Level of Social Insurance Contribution**

Taking into account the substantial increase in the number of pensioners and the significant diminishing of the number of contributors (which deteriorates the rate of dependency of the PAYG system) in the State social insurance system (base pension system), ever since 1992 the Government had the increase social insurance contributions from 14% to 25.5% in 1992 and 32.5% as of 1999. Contribution is calculated in percentages of gross income, varying between 20 and 40%, depending on the work group.

In the event that a reform of the pension system is not completed, simulations indicate that the social insurance contribution rate would have to increase to 41.5% by the year 2040, simply in order to maintain the 1998 rate of replacement of salaries by pension benefits.

As concern the supplementary pension system, the annual incomes obtained from levying the 3% contribution were no longer sufficient to cover supplementary pension expenses and the surplus accumulated during past years was resorted to in order to obtain a budgetary balance.

In fact, this system started to register a budgetary deficit in 1998, as compared to 1997, when it still registered a surplus of 560.7 billion ROL (which represented the equivalent of the benefits due for about 4 months), and to 1994, when the same surplus represented 338 billion ROL (which allowed payment of additional pensions for over one year).

Table 3. Effective Average Age of Retirement

Pension Category	1996		1997		1998	
	Women	Men	Women	Men	Women	Men
Full pension – full length of service	54	56	54	56	54	56
Full pension – incomplete length of service	58	62	57	62	57	62
Invalidity I-st degree	42	47	43	46	43	46
Invalidity II-nd degree	46	48	45	48	45	48
Invalidity III-rd degree	45	48	45	47	45	47
TOTAL STATE SOCIAL INSURANCE PENSIONERS	51	54	51	54	50	54

Table 4.

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Average nominal monthly pension	1.602	3.357	8.759	27.079	61.370	88.108	123.988	254.917	388.228
Average net nominal salary	3.381	7.480	20.140	59.717	141.961	211.373	321.169	632.315	1.073.898
Ratio Pension – Salary (%)	47.4	44.9	43.5	45.3	43.2	41.7	38.6	40.3	36.2

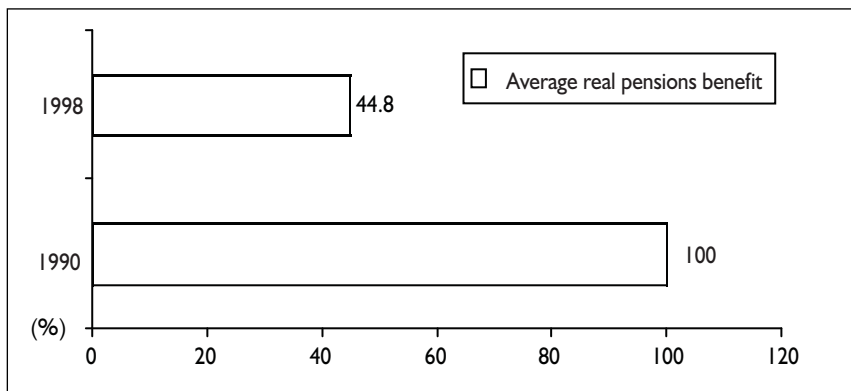
Under the circumstances, the Romanian Government had to increase the contribution for this complementary pension, from 3% to 5%, as of January 1, 1999.

#### **4.4. Evolution of the Amount of Social Insurance Pensions**

Although the nominal value of pensions was increased by successive indexations, arbitrary increases and re-correlations, their real value diminished relative to salary incomes, which are, in principle, the basis for pension benefits calculations. Thus, the ratio between the average total social insurance pension benefit and the average net salary diminished from 47.4% in 1990 to 36.2% in 1998 (Table 4).

As regards the average pension benefit for full pensions and full length of service, the ratio deteriorated even more. Consequently, in 1998 the average real pension benefit was only 44.8% of its level in October 1990 (Figure 3).

**Figure 3. Evolution of the average real pensions benefit: 1990–1998**



#### **4.5. Indexation and Re-Correlation of Pensions**

Major disparities resulted in the pension system following the adoption in 1990 and 1991 of larger fixed-amount increases for persons with lower pension benefits, and the differentiated increase of pension benefits of August 1, 1991.

Indexation of pensions (and of salaries) was made in the period 1991–1998 in accordance with increase of the consumption price index. Indexation was not



automatic. The increases were the result of frequent negotiations with trade unions', employers' and pensioners' organizations. About 45 indexations of pension benefits were granted between 1991 and 1998, all of them covering only partially consumption price rises. The result was that the real level of pensions continuously deteriorated.

As a consequence of this process pension benefits in 1998 no longer reflected the length of service and the amount of the salary (which expresses the importance and quality of the activity carried out prior to retirement). The result was continuing pressure from the pensioners' organizations, to reform the pensions system.

Thus, while the average total State social insurance pension benefit increased 242 times between 1990 and 1998, the average full pension for full length of service only increased 230 times during the same period, and the average full pension for incomplete length of service increased 245 times. Pension benefits below the average level in each category registered higher increases, and pension benefits above the average level increased proportionally less. The average net salary at economy level increased 318 times during the same period of time (1990–1998).

A series of measures intended to re-correlate pensions were adopted, with a view to correct this leveling of pension benefits, from 1996 through 1999.

#### **4.6. Inequity of the Pension Calculation Formula**

The fact that the basis for pension benefit calculation is the salary income obtained during five consecutive years, selected from among the last 10 years when social insurance contribution was paid (and not on contributions during the whole length of service) leads to high disparities between pension levels for persons with the same period of contribution within the same socio-professional category. This tendency has been further exacerbated by the high level of salaries paid to employees of regies autonomes, financial-banking companies and certain private or mixed capital companies, as compared to, for example, salaries paid to employees in the budgetary sphere. Payment of high contributions during the last five years by some persons, although during the rest of their active period (over 20 years) they paid much less, made it possible for them to obtain pension benefits twice or three times higher than those of others, who gained lower salaries during those last five years, but paid their contributions the same number of years.

The possibility arose of illegally manipulating pension benefit levels, based on arrangements made between employers and future pensioners.

Table 5.

<b>Pension Category</b>	<b>1980</b>	<b>1985</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>
Full pensions – full length of service	13.7	15.1	14.6	14.6	12.3	12.3	12.5
Full pensions – incomplete length of service	12.3	13.2	14.2	15.7	13.2	13.5	13.7
Total full pensions	13.1	14.2	14.5	15.1	12.7	12.7	13.1
Invalidity I-st degree	4.7	5.2	6.0	6.6	5.8	5.6	6.1
Invalidity II-nd degree	5.4	5.2	4.6	5.6	4.7	4.6	5.1
Invalidity III-rd degree	10.7	17.2	16.0	11.3	2.9	3.3	4.1
Total invalidity	7.0	5.2	4.8	6.0	4.8	4.6	5.2
Survivor pensions	13.0	15.2	15.2	15.0	13.1	13.2	13.2
<b>TOTAL SOCIAL INSURANCE</b>	<b>11.0</b>	<b>13.1</b>	<b>13.4</b>	<b>14.0</b>	<b>11.9</b>	<b>11.7</b>	<b>12.2</b>

## **4.7. Average Pension Payment Duration**

The average duration of payment of full pension benefits is about 12–13 years, higher in the case of pensions corresponding to an incomplete length of service. This difference is amplified by the higher share of women in this category, because they have a higher life expectancy than men. The pension duration payment in the case of invalidity or survivor pensions has been relatively constant during the last period of time, i.e. about 5 years for invalidity pensions and 13 years for survivor pensions (see Table 5).

## **4.8. The Special Problems of the Farmers' Social Insurance System**

Due to the optional character of farmers' social insurance contributions, the number of contributors in this system is very low, about 70 – 80 thousand persons. The ones who pay such contributions are generally close to the legal retirement age and are interested in increasing the number of years they worked in agricultural production cooperatives, recognized under the law.

In accordance with Law No. 80/1992, business entities which produce, process or commercialize agricultural and food products levied a contribution of 2 – 4 % of incomes obtained in agriculture or processing of agricultural or food products. This system was in force until January 1, 1995. From that date until December 31, 1996, in accordance with the provisions of Romanian Government Ordinance No. 70/1994 regarding profit tax, the farmers' social insurance system was almost totally (over 90%) financed by State budget subsidies.

After January 1, 1997, Law No. 73/1996 reintroduced the obligation of business entities which produce, process and commercialize agricultural and food products to levy contributions in order to finance the farmers' social insurance system.

Financing of the farmers' social insurance services is thus assured either by the contributions of business entities who produce, process and commercialize agricultural and food products or by State subsidies.

Due to the fact that many of those who work in agriculture do not pay contributions for social insurance, as they get old and have no more sources of income, they have to be supported by their children or, very often, by the social assistance system, financed by the State budget.

An increase in the amount of their pension benefits is not possible without providing adequate sources of social insurance incomes, based on contributions paid by active persons.

The number of pensioners in this system is large, and is continuously increasing; it reached 1,827,276 persons at the end of 1998, as compared to 982,883 on December 31, 1989 (an increase by 85.9%).

The average farmer's pension was 37,148 ROL on December 31, 1996, i.e. 145.1 times higher than in December 1989 (256 ROL). Although it was substantially increased during the first semester of 1997, reaching 64,726 ROL (252.8 higher than in 1989), could not, under pre-reform conditions, be brought to levels comparable to the ones in the State pensions system, for lack of financial resources.

In 1998, the average nominal farmers' pension represented about 25% of the average nominal State social insurance pension and less than 10% of the average nominal net salary in the economy as a whole.

## **4.9. Increasing Evasion**

The State social insurance budget has been increasingly in deficit. Thus, on December 31, 1998 expenses exceeded incomes by 1,500 billion ROL. Disparities between the amounts collected and the amounts to be paid occurred during the year made necessary the allocation of interest bearing advances from the Treasury.

In 1996 the State granted for the first time subsidies to the State social insurance system (amounting to 312 billion ROL); this happened again in 1997 and 1998; the Budget for 1999 also provided such subsidies.

As regards the farmers' social insurance pension budget, subsidies from the State budget amounting to about 2,000 billion ROL were provided in the 1999 budget. They cover about 60% of amount necessary for farmers' pensions, estimated to about 3,300 billion ROL.

The difficulties confronting the social insurance budget are also due, besides the reasons mentioned above, to the high increase of evasion. Many business entities, some of them employing a large number of people, do not pay their social insurance contributions. Evasion from payment of State social insurance contributions reached alarming levels, amounting to a maximum of about 28% in 1996, then diminishing to about 25% in 1997 and about 23% in 1998.

This still insignificant diminishing of evasion is due to a series of measures taken by the Government, such as: the setting up of a social insurance control body, forced execution of indebted business entities, providing of special regulations in the social insurance budget law.

## **4. Implicit Debt of the Pre-reform Public Pension System**

One succinct way to represent the quantitative importance of the expenditure commitments implicit in the pre-reform public pension system is to calculate the present discounted value of those liabilities. This section uses a demographic model of the Romanian public pension system developed by the Paris-based consulting firm Quantix to estimate the implicit debt of the public system in Romania as of 1997.

The model, which is not strictly actuarial, is intended for the simulation of medium term scenarios. It uses functional forms which can be extrapolated over long periods to approximate demographic distributions by gender and work status [2]. The model was used to simulate forward current expenditures for existing retired persons and future expenditures for the current working population when it retires.

### **Existing Retirees**

Concerning the existing retirees, data from the 1999 budget was used.

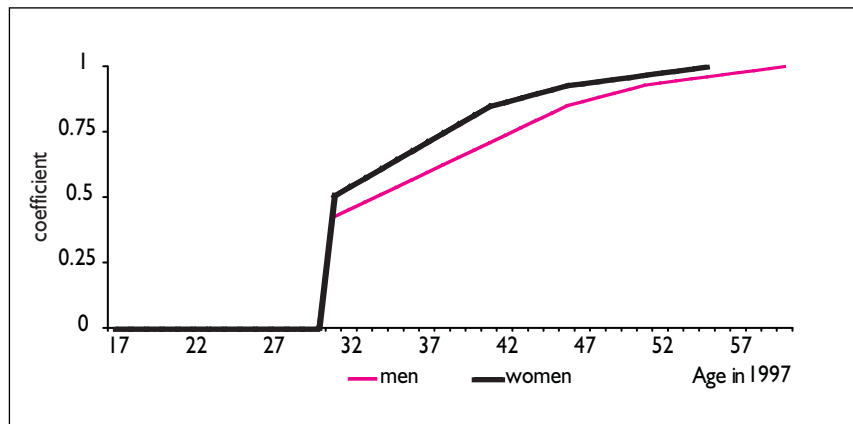
<b>All existing retirees (including farmers and self-employed) – 1999</b>	
Women: Number of Pensioners ( old age)	3,001,480
Men: Number of Pensioners ( old age)	1,762,034
Number of survivors	640,000
Number of disables	520,000
<b>Total</b>	<b>5,923,000</b>

### **Current Workers**

In order to estimate the right acquired by the existing workers, it was assumed that the pension system remains unchanged. The legal retirement age was assumed to remain 60 years for men and 55 years for women, with actual effective retirement ages being distributed around those standard ages in the same manner as prior to 1997. Old age pensions were computed on the basis of the 5 best wages within the career and the period necessary for the obtaining of a full pension was taken to be 25 years for women and 30 years for men. In the pre-reform system, men and women must work a minimum of 14 years to be entitled to any pension. Consequently we reduced pension commitments pro rata to take account of the fact that the implicit liability of the system in 1997 did not cover years not yet worked.

[2] The model also simplifies the operating rules of the public scheme. For instance, it consolidates work categories (group I, II, III) into one, and uses average figures for the consolidated whole.

**Figure 4. Coefficients Used to Reduce Pro-rata the Rights Acquired by Current Workers**



### Survivors and Disability

Survivors' pensions have been simply broken down by age, following a classical distribution, then the reversion rates have been determined dividing the distribution of reversions by age, by female population by age. In the projection, the female population is multiplied by the vector of survivors rates. The rights acquired by survivors are calculated for existing and future survivors.

Only those disabled younger than the retirement age are forecasted (according to the observed disability rates). Beyond the legal retirement age, disabled are considered as retirees. In the simulation, we suppose that the disability rate is a reverse function of the activity rates for elders. The rights acquired by disabled are calculated for existing and future disabled.

### Growth Scenario

The main assumptions of the simulation are the following:

Real terms	1999	2005	2010	2020	2030	2040	2050
Real GDP growth	0%	2%			2%		
Real wage growth	0%	2%			2%		

### Demographic Scenario

The main assumptions of the simulation are the following:

	1999	2005	2010	2020	2030	2040	2050
Men: life expectancy (years)	65.6	66	68	69	72	73	73
Women: life expectancy ( years)	73.4	73.5	75	77	79	80	80

The implicit debt has been calculated for four discount factors (see Appendix).

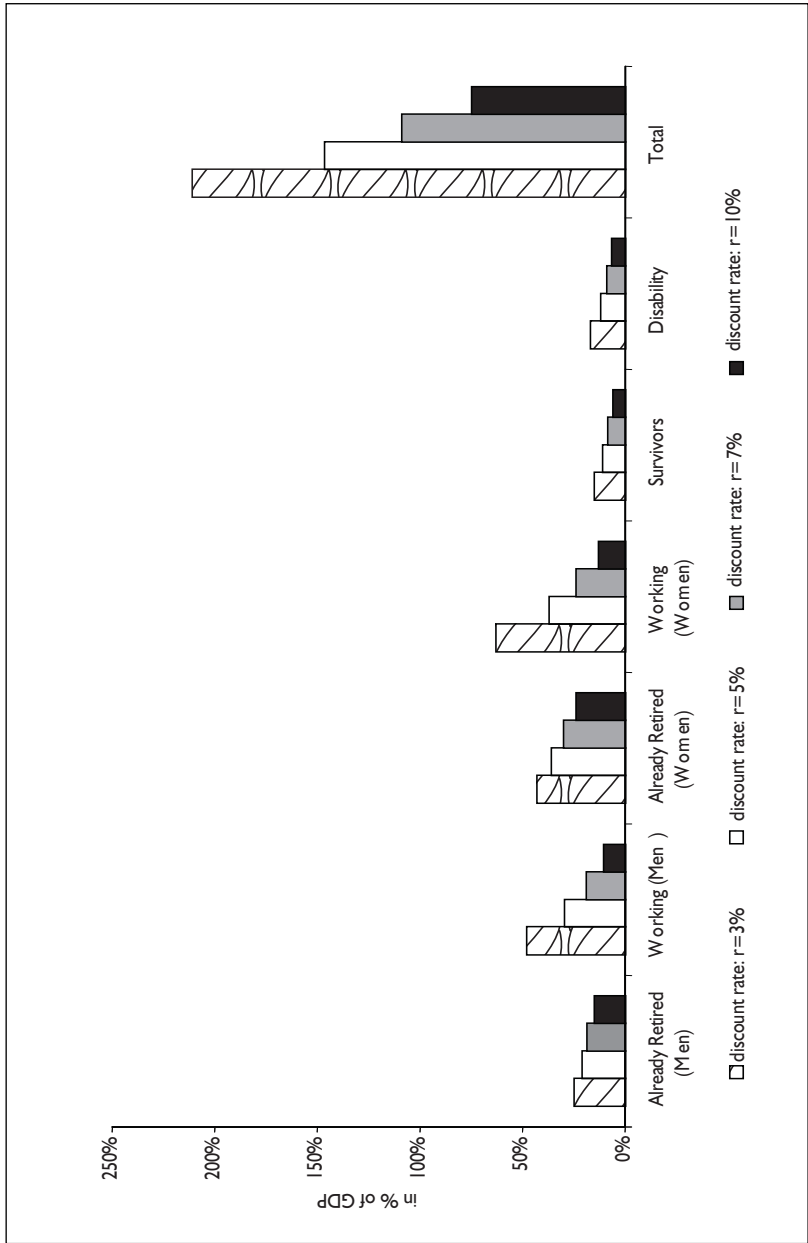
## 6. Conclusions

The simulations of the preceeding section give a measure of the magnitude of the implicit liabilities of the public pension system, pre-reform, in Romania, in 1997. They are unquestionably large, 50 percent larger than 1997 GDP at a 5% discount rate, and twice as large at a 3% discount rate.

It is interesting to note that women contribute significantly more than men to these liabilities. The preceeding table shows that, if one uses a 5% discount rate, the total liabilities to women are forty percent larger than the total liabilities to men. This reflects primarily the fact that women's life expectancy is seven to eight years longer than that of men throughout the projection period. Their longer life more than offsets their lower remuneration, and consequently lower pension benefits.

Taken together, these calculations, and this summary of the burdens of the pre-reform public system in Romania, highlight the urgency of deep reform of the public system and the need to establish a private, capitalized system.

Figure 5. Romania: Implicit Debt





**Table 6. Implicit Debt in % GDP**

<b>Discount factor</b>	<b>MEN</b>			<b>WOMEN</b>			Survivors	Disability	<b>Σ</b> Total
	Already Retired	Working	Total	Already Retired	Working	Total			
<b>r = 3%</b>	25%	48%	<b>73%</b>	43%	63%	<b>106%</b>	15%	17%	<b>211%</b>
<b>r = 5%</b>	21%	29.5%	<b>51%</b>	36%	37%	<b>73%</b>	11%	12%	<b>147%</b>
<b>r = 7%</b>	18.5%	19%	<b>38%</b>	30%	24%	<b>54%</b>	8.5%	9%	<b>109%</b>
<b>r = 10%</b>	15%	10.5%	<b>26%</b>	24%	13%	<b>37%</b>	6%	6.5%	<b>75%</b>

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## Appendix Actualization

Let's note :

$i$  = interest rate

$r = 1+i$  = capitalization factor

$$v = r^{-1} = \frac{1}{(1+i)} = \text{discount factor}$$

If, at the end of each year, the interests are added to the capital, then a capital with an initial value  $K_0$  reaches after  $n$  years the final value :

$$K_n = K_0 r^n$$

Conversely, if the value  $K$  is known, the initial value  $K_0$  is computed as follows :

$$K_0 = K r^{-n} = K v^n$$

$K_0$  is called the expected value of  $K$  on  $n$  years, or the actual value of  $K$ .

If we note  $D_t$  the value of the public scheme debt at time  $t$ , then the actualized value is:

$$D_0 = \sum_t D_t r^{(t-t_0)} = \sum_t D_t v^{(t-t_0)}$$

If we express  $D_0$  as a function of the GDP the formula is:

$$D_{(0)1997} = \left[ \frac{\sum_t D_t r^{(t-t_0)}}{GDP_{t_0}} \right] = \left[ \frac{\sum_t D_t v^{(t-t_0)}}{GDP_{t_0}} \right]$$

That is to say that the actualized deficit is expressed in % of the GDP of  $t_0$ .



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