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HELLAS, PENSION EXPENDITURE COUNTRY FICHE 2008 November 2008

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1. Introduction

Since its establishment in 2002, the National Actuarial Authority of Greece (NAA) has been developing its own infrastructures for evaluating the long term sustainability of the social security pension and the public health system, in line with its mandate.

In this context, NAA has recently initiated collaboration with the International Labor Office (ILO), aimed at developing analytical actuarial models for the main pension funds. As part of this collaboration, NAA staff has received training on the use of the models, which can be updated and progressively expanded to cover additional aspects of the system. This study is based primarily on the modeling framework jointly developed with ILO, adapted to the demographic and macroeconomic assumptions of the EPC AWG. The analysis is complemented by a non-actuarial method for approximating the evolution of pension spending in the part of the system which is not explicitly modeled. Details of the analytical models and the non-actuarial approximation are provided in section 4.

2. Overview of the pension system

The Greek social security system is, in principle, based on three pillars:

- I. The first pillar is public, mandatory and includes primary and auxiliary pensions, covering the risks of old age, death, disability and sickness. Provident funds provide lump sum benefits and although membership is not compulsory they also belong to the first pillar.
- II. The second pillar is not mandatory and refers to fully-funded occupational schemes, covering the same risks as the first pillar.
- III. The third pillar refers to private insurance.

However, pensions in Greece are provided almost exclusively by the state through the first pillar and there is very limited recourse to occupational schemes and private pensions¹. In 2007, gross pension spending amounted to 11.7% of GDP, 99.5% of which consisted of first pillar public pensions. Public pensions are provided through a plethora of funds, which have the status of public entities and form part of the general government sector². The funds offer defined benefits based on employer and employee contributions. Though the funds are permitted to retain any existing cash surpluses - reflecting the system's original conception as a funded system - in total, these are not very significant and they generally operate as pay-as-you-go (PAYG) schemes. The large number of funds arises from the historical development of the pension system,

¹ Mylonas and de la Maisonnette (1999), report that insurance companies attribute the low demand for private pensions to the generosity of the public pension system.

² Before the March 2008 pension reform (Law 3655/2008), there were 133 different funds under the supervision of the Ministry of Employment and Social Protection.

whereby funds were created by individual sectors. Partly as a result, the benefit schemes offered by the funds, or even within the funds, differ. Workers are insured by one primary fund at a time, according to their occupation, but usually have supplementary coverage, which may be provided by a separate auxiliary and/or provident fund.

Operating effectively as PAYG, the Greek social security system is directly exposed to the risks posed by ageing populations. The demographic challenge in Greece has consistently been projected to be more severe than the EU average and the 2008 Eurostat projections report deterioration in the old-age dependency ratio³ from 27.8% in 2008 to 57.1% in 2060. The relation between insurants and pensioners has reached 1.75:1 instead of 4:1 which is required for a viable pay-as-you-go distributive pension system.

As a result the National Regular Budget (NRB) contributes increasing amounts for the social security services year by year. For 2007 the NRB included the amount of 10,347,926 euro, in comparison to the 2006 amount which was 9,718,281 euro. The above expenditure for social services refers to pensions of politicians, military, municipal and community workers, allowances to members of National Resistance (not covered by security organizations), expenditures of medical care to public officers and pensioners, subsidies of institutes in social care and hospitalization, and other expenditures of the Ministry of Health and Social Solidarity.

The overall replacement ratio⁴ of 60.6% in 2007 conceals the significant differences in the generosity of pension payments among the various schemes, as replacement ratios can range from 10.6% for farmers to 149.8% for civil servants. In addition, there can be significant differences within professional categories in the same scheme. Overall, existing legislation draws a broad distinction between those insured before and after 1993, with the former generally enjoying more generous provisions regarding age thresholds, replacement rates and eligibility conditions. As regards private sector wage earners, for example IKA-ETAM fund, the statutory retirement age for females insured before 1993 is set at 60 years of age, rising to 65 for those insured after 1993. Depending on the fund, however, there can be many more splits among participants with equally different provisions. An example of the multiplicity in the eligibility provisions is shown in the Part A of the Appendix, for the funds IKA –ETAM, OGA, OAEE and Public Sector (PS).

The extensive fragmentation of the system has long been acknowledged as a serious impediment for effective monitoring, providing numerous channels for early retirement, facilitating contribution evasion, leading to pronounced inequalities and high administrative costs. The recent reform (Law 3655/2008) passed in March 2008,

³ The old-age dependency ratio is defined as: (population aged above 65)/(population aged 15-64).

⁴ The replacement ratio is defined as: (average new pensions) / (average wage)

takes a decisive step towards addressing the administrative deficiencies of the system, while also including a number of parametric adjustments.

Key features of the recent reform of the social security system (Law 3655/2008)

Administrative features:

- Addressing decisively the fragmentation of the system, by reducing the number of funds from 133 to 13, significantly reducing administrative costs and improving monitoring and supervision.
- Introduction of an Individual Social Security Number, effective from 01.06.2009, allowing, inter alia, for improved expenditure control. The introduction of the Individual Social Security Number is also expected to assist employment inspection, thus contributing in reducing contribution evasion.
- Establishment of the Insurance Fund for Inter-generational Solidarity (AKAGE), in order to safeguard future pension payments. AKAGE will accumulate reserves in order to finance pension payments of social security funds for the years beyond 01.01.2019. Starting 01.01.2009, AKAGE will be funded by:
 - 10% of annual total privatization revenue,
 - 4% of the annual VAT revenue,
 - 10% of total annual receipts from special social resources of Social Insurance Funds, branches or accounts, as described in article 150 in Law 3655/2008.

Parametric features:

- Financial incentives for extending working lives by up to 3 years past the statutory retirement age and increased disincentives for early retirement.
- Stricter eligibility conditions, mainly for wage earners (IKA-ETAM).
- Strengthening provisions regarding maternity leave, aimed at facilitating female participation in the labor market.

In addition, a review has been initiated regarding the list of “arduous and unhealthy occupations”, which could result in stricter eligibility criteria for early retirement.

Summary of main reforms in the pension system in the recent past:

1. Law 2084/1992. It separated insurants to those who have been employed since 1993, “pre-93’s” and to those who were employed after 1992, “post-92’s”. The former generation retained higher replacement rates and shorter careers than the later. The law reduced pensions by 1/200 for each month prior to the age of 65, with maximum reduction 22.47%. It also equalized the general thresholds for male and female by rising the normal (full pension) retirement age of women, from 60 to 65. It also induced a state contribution for the IKA-ETAM of 10% on the gross salary of the employee.
2. Law 3029/2002. It performed a first administrative merging of 10 main pension schemes of employees to IKA-ETAM by 2008, the so called “special

funds". The merging was accompanied with a unified rule for the pension formula to that of IKA-ETAM for the "post 92's", less generous than the one of the special funds, and also less contributions equal again with those of IKA-ETAM. It induced an incentive for careers longer than 35 years by increasing 50% the accumulation percentage from 2% to 3% until the 37th past service year. It changed the 1/200 reduction of early pensions to 1/267. It replaced the 10% state contribution on the gross salary of every IKA-ETAM employee to 1% of the GDP since 2030. It also founded the second pillar occupational insurance. The impact of this law on the pension spending system is not officially analyzed and it is difficult to do so because, as far as sustainability is concerned, it worked in various directions.

3. The recent reform, Law 3655/2008 enacted massive merges of the main, auxiliary, providence and health funds without altering pension or contribution formulas. It draw back the reduction for private sector employees to 1/200 and added gradually, on average, 5 years to special women groups such as mothers of under aged children, mothers of three or more children etc., who could generally retire from the of age 55. Its main impact was in IKA-ETAM, by reducing the pension cost, and thus for the whole social security system, by 0.5% of GDP at 2060. It generally did not have any effect on self employed and farmers where the minimum age of retirement is 65 and such groups do not exist. It also did not affect the Public Sector.

Table 10: Historical and assumed indexations for IKA-ETAM, OGA and OAEE

NOMINAL INDEXATIONS	IKA-ETAM	OGA	OAEE
Historical Salaries and/or Insurance Category (Class)	Salaries 2003 → 3.90% 2004 → 6.08% 2005 → 5.57% 2006 → 8.15% 2007 → 5.1% Insurance classes 2007:4% The number of categories for those insurant before 1993 is 28	Insurance Categories 2003 → 4,07% 2004 → 4,01% 2005 → 5% 2006 → 4% 2007 → 4%	
Projection Assumption for Salary	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)
Historical Pensions	Amount 2003 2004 2005 2006 2007 0-500 4% 5% 4% 4% 4% 500.01-1000 2% 3% 4% 4% 4% >1000 0% 0% 4% 4% 4%	2003 → 4,01% 2004 → 3,5% 2005 → 4% 2006 → 4% 2007 → 4%	
Projection indexation of pensions	Inflation + 0.5%	Inflation + 0.5%	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)
Pension Formulas	For the pre-1993 is: (daily earnings of class*25)*(percentage corresponding to class) + increment corresponding to class +family allowances for spouse and children. The class is determined according to the average of the best five year salaries in the last decade, indexed by the pension indexation accordingly. For the post-1992 is: 2 %*(years of service)*average salary of the best 5 years during the last working decade indexed accordingly.	OGA main pension branch: 2%* amount of insurance category by offset of retirement* years of insurance in each category Amounts 2007: 1) 399.93 2) 495.74 3) 596.53 4) 736.10 5) 875.66 6) 1014.24 7) 1151.79	2%*(category rate) *(years in each category), 3%*(category rate)*(years in each category), when the past service is 35-37 years, 2 %*(category rate)*(years in each category), when the past service is 38 years and over.

NOMINAL INDEXATIONS	IKA-ETAM		OAEI
Contribution Formulas	Employer's : 13.33% * gross salary Employee's : 6.67% * gross salary State's : 1% of GDP until 2030	Farmer's : 7% * amount of insurance category State's : 14% * amount of insurance category	20% * ins. category amount

Table 11: Historical and assumed indexations for the Public Sector Employees

NOMINAL INDEXATIONS	Public Sector Employees	Rest of the schemes
Historical Salaries and/or Insurance Category (Class)	2003 → 2.05% 2004 → 5.4% 2005 → 3.6% 2006 → 3.0% 2007 → 3.5% 2008 → 4.5%	
Projection Assumption for Salary	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)	Yearly evolution of the nominal gross salary (real salary evolution plus inflation)
Historical Pensions	4% from 2005-2007	
Projection indexation of pensions	Inflation +0.5%	Inflation +0.5%

NOMINAL INDEXATIONS Pension Formulas	Public Sector Employees For those who are employed before 1993 and going to retire until 2007: Pension= family allowance + smoothing allowance + [max(1, years of service*2,857%)]*(1+0,3*W/35)* *[1+2%*max(5, years of service-35)]*(1+b/35)*80%*(Basic Salary) (σ)+TAPA For those who are employed after 1992 and going to retire until 2007: The same formula above except for 2% accumulation has replaced 2.857% and the family allowance adds to the formula, is 8% for one child, 18.88% for two children and 33.05% for three or more children. For those who are employed before 1993 and going to retire from 2008 and then: Pension= family allowance + smoothing allowance + [max(1, years of service*2,857%)]*(1+0,3*W/35)* *[1+2%*max(5, years of service-35)]*(1+b/35)*max(80%-k/100,70%)*	Rest of the schemes Average pension 2007 indexed
<p>$\sum_{m=1}^{\alpha} \prod_{n=1}^{\alpha-m} (1+i_{\sigma-n+1}) * 12 * (basal)_{\sigma+m-\alpha-1} + \prod_{n=1}^{\alpha-m} (1+j_{\sigma-n+1}) * TAPA_{\sigma+\mu-\alpha-1} + \sum_{\xi=1}^{\omega} (basal_{\sigma} + TAPA_{\xi})$</p> <p>V</p> <p>For those who are employed after 1992 and going from 2008 and then: The same formula above except for 2% accumulation has replaced 2.857% and the family allowance adds to the formula, is 8% for one child, 18.88% for two children and 33.05% for three or more children.</p> <p>PARAMETER DEFINITION: W = years of theoretical past service, b= factor according to professional category (from 0.3 to 3), basal = basic salary, σ= year of pension exit, example: 2011, κ = T -2007, years of service after 2007, α = years of averaging = abs(κ), ω = abs (months of service at the year T) λ= years of service until 2007 = days360(31/12/2007,date of entry)/360, v =months of service after 2007, TAPA = total average pensionable allowance = Average (family allowance + 140.80+...etc.), ip = pension indexation of year p, jp = TAPA indexation of year p</p> <p>EQUATION DEFINITION: it is the sum of the salaries after 2007 without Christmas, Easter and holiday allowances all indexed until the exit year σ</p>	<p>Average pension 2007 indexed</p>	
<p>Contribution Formulas</p> <p>Before 1993: (Basic Salary+140.80)*6.67% After 1992: all the pensionable contributions * 6.67%</p>	<p>Average contribution indexed</p> <p>2007</p>	



3. Pension projection results

- **Extent of the coverage of the pension schemes in the projections**

The current exercise projects approximately 99.5% of total pension expenditure in 2007 through to 2060; corresponding to public, first pillar pension payments. However, analytical actuarial models were used only for the four biggest social security primary pension funds, namely:

- IKA-ETAM (private sector wage earners),
- OAEE (self employed),
- OGA (farmers) and
- Public Sector employees (PS).

Those funds belong in "Group1" and in 2007 they cover 90% of the working population, 92% of pensioners and represent approximately 67% of total pension expenditure and 79% of the total deficit. The models for these four funds were developed in collaboration with the International Labour Office (ILO).

The evolution of all remaining schemes was projected using non-actuarial methods, also developed in collaboration with ILO. Specifically:

- The evolution of the primary pension funds: TSMEDE, TAPOTE, NAT, and TAN and the auxiliary pension funds: MTPY and ETEAM, henceforth "Group2 schemes", was projected using the "IKA-ETAM" age distributions of old age pensioners, invalidity and death pensioners, average age of contributors and awardees, average benefit and average pension.
- The impact of other schemes, henceforth "Group3 schemes" is calculated as a loading in the result obtained from the sum of results of "Group1" and "Group2" funds. Provident funds are also included in the study as part of "Group3", although presently, benefits are not expressly guaranteed by the national budget.

The study does not cover second and third pillar funds, due to methodological and data constraints and their limited significance (approximately 0.05% of gross pension spending in 2007).

- **Overview of projection results**

Pension spending for the social security system, as a percentage of GDP, is projected to rise significantly over the next 53 years, from 11.7% of GDP in the base year to 24.1% of GDP in 2060. Demographic developments are the single most important driver, with the dependency ratio clearly having the most sizeable impact on pension expenditure throughout the projection period, with the exception of the final decade 2050-2060. The coverage ratio has a comparatively small, but negative impact, reflecting mainly the assumed increase in the participation rate of older workers, especially in the early years of the projection period. Similarly, the increase in employment has a comparatively small, yet

mitigating effect up until 2020. The benefit ratio has a positive contribution until the mid 2030s. Thereafter, though, it turns negative and remains so until the end of the projection period.

Although pension spending is projected to increase throughout the projection period, two distinct sub-periods can be identified. In the years before 2035, expenditure growth is accelerating, whereas after 2035 the pace starts slowing down. Although the demographic pressure is clearly reduced during the last ten years of the projection, its positive impact remains strong between 2035 and 2050 and does not justify the qualitative change in the pace of spending growth. The factors behind this change are systemic and can be associated to the split between old (pre-1993) and new (past 1992) workers. As the former generally enjoy more favourable provisions, the pressure on pension payments is alleviated, as the relatively more privileged workers are exiting the system. This is also corroborated by the reversal in the sign of the impact of the benefit ratio, which turns negative after 2040 and remains so until the end of the period, pointing to the reduced generosity of new pension payments.

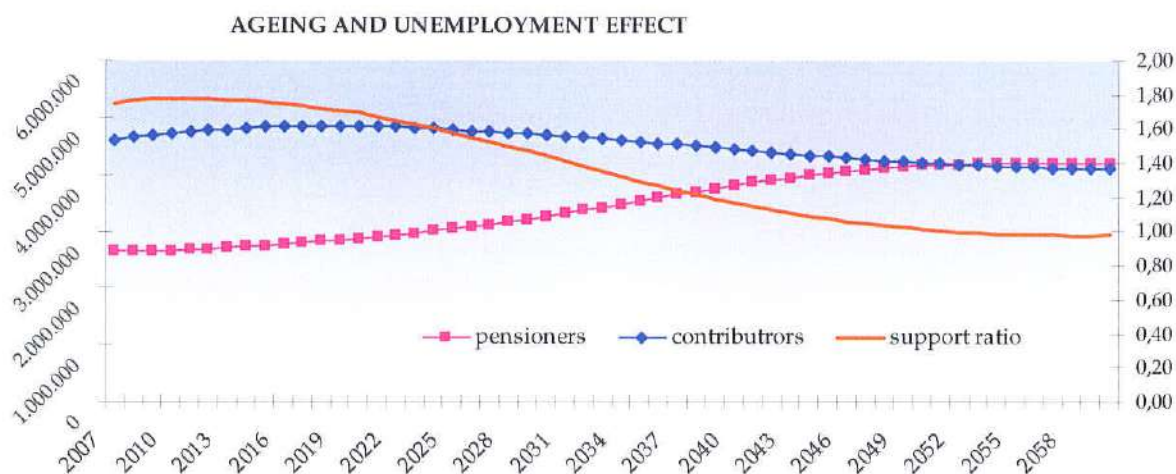
At a first glance, this appears to be at odds with the evolution of the overall replacement ratio, which starts at 60.6% in 2007 and reaches 66.5% in 2060. However, looking at individual schemes, it becomes apparent that the generosity of new pensions is clearly reduced for wage earners (IKA-ETAM) and public servants, for which there exists a more clear distinction between old and new participants.

Table 1: Projected gross pension spending, tax on pension and contributions (% of GDP)

	2000	2007	2020	2030	2040	2050	2060	Peak year
Social security pensions	10.82*	11.7	13.2	17.1	21.4	24.0	24.1	2055
Old-age and early pensions	:	8.8	9.9	13.1	16.3	17.9	17.7	2053
Other Pensions	:	2.9	3.3	4.0	5.1	6.1	6.4	2059
Occupational pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	:
Private pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	:
Mandatory private	0.0	0.0	0.0	0.0	0.0	0.0	0.0	:
Non-Mandatory private	0.0	0.0	0.0	0.0	0.0	0.0	0.0	:
Total pension expenditure	:	11.7	13.2	17.1	21.4	24.0	24.1	2055
Taxes on public pensions	:	:	:	:	:	:	:	:
Taxes on private pensions	:	:	:	:	:	:	:	:

*From the British actuaries study of 2000.

Graph 1: Pensioners, Contributors and Support ratio



Graph 2: Pension expenditure and Deficit as % of GDP and Benefit ratio

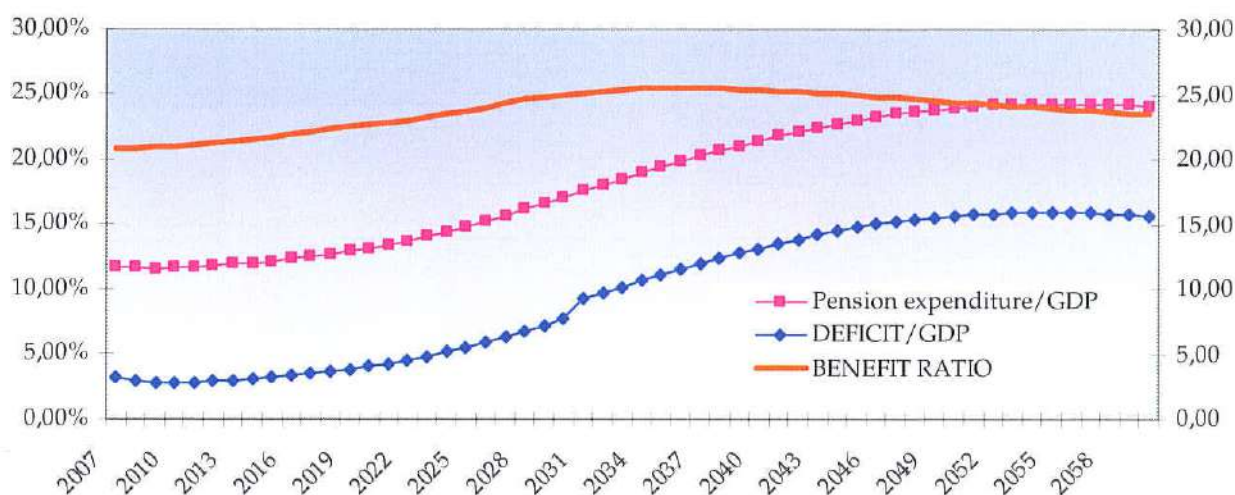


Table 2: Projected gross public pension spending: by scheme, as a % of GDP

	2000*	2007	2020	2030	2040	2050	2060	Peak year
Total Social security pension	11.06	11.70	13.20	17.10	21.40	24.00	24.10	2055
<i>Of which</i>								
Public employees sector	2.00	2.03	2.19	2.72	2.93	3.21	3.37	2060
Private employees IKA- ETAM	4.17	3.30	3.67	4.99	7.07	8.57	8.50	2054
Farmers, OGA	2.14	1.55	1.14	1.01	1.06	1.05	0.93	2007
Self-employed, OAEE	1.18	0.93	1.59	2.33	2.89	2.85	2.54	2043
Others, 'rest of the schemes'	1.57	3.89	4.61	6.05	7.45	8.32	8.76	2060

*Figures from the 2000 British Government Actuaries study.

Table 12: Assumptions and differences in the driving forces for the various projected groups

	ASSUMPTION FOR THE YEARLY CONTRIBUTORS' EVOLUTION	INSURANT POPULATION	SUPPORT RATIO 2007, 2060	BENEFIT RATIO 2007, 2060	REPLACEMENT RATIO 2007, 2060
Total		4,609,000	1.75, 0.98	20.80, 23.48	60.65, 66.50
Public sector employees	Stable (Closed group)	549,000	1.59, 0.96	27.07, 24.14	150.00, 111.22
Private sector employees IKA- ETAM	According to employed population by age	2,425,000	2.54, 1.04	13.13, 15.67	84.17, 70.00
Farmers, OGA	1% decline from the base year	661,413	0.79, 0.70	4.98, 6.72	10.59, 20.99
Self-employed, OAEE	According to employed population by age	576,426	2.05, 1.12	15.16, 23.29	80.00, 85.10
Others, 'rest of the schemes'	According to total employed	398,000	2.94, 0.90	10.35, 7.22	48.21, 44.04

Based on historical data, IKA-ETAM employees and the self-employed of OAEE are assumed to grow in line with total employees. On average, IKA- ETAM contributors are younger than those of OAEE and OGA. OGA, on the other hand, is diminishing, in line with the historical decline of the agricultural sector, while OGA actives are concentrated on comparatively higher age cohorts.

The population of the rest of the schemes is even younger than that of IKA-ETAM, so the ageing effect and the deficits are expected to have their impact later than IKA-ETAM but equally severely.

Description of main driving forces behind the projection results and their implications for main items from a pension questionnaire

$$\frac{\text{Pension Exp.}}{\text{GDP}} = \frac{\overbrace{\text{Population 65+}}^{\text{Dependency Ratio}}}{\text{Population 15-64}} \times \frac{\overbrace{\text{Number of Pensioners}}^{\text{Coverage Ratio}}}{\text{Population 65+}} \times \frac{\overbrace{\text{Population 15-64}}^{\text{1/ Employment Rate}}}{\text{Working People}} \times \frac{\overbrace{\text{Average Pension}}^{\text{Benefit Ratio}}}{\frac{\text{GDP}}{\text{Working People}}}$$

In the Part B of the Appendix of the report we can see the diagrams for the

- a. Pension Exp./ GDP, figure 1.5
- b. Dependency ratio, figure 1.4
- c. Coverage ratio, figure 1.2
- d. 1/Employment rate, figure 1.10
- e. Benefit ratio, figure 1.6

As we previously analysed, the ageing effect, along with the awarding of “pre-93’s” pensioners are becoming more and more apparent until 2035. It is the period when we have the bigger growth of the pension expenditure and also with faster rates. After that time the effect passes, due to an establishment of a new equilibrium between pensioners and workers and also because “post-92’s” pensioners receive on average less pensions as in IKA-ETAM (most private workers become pensioners before the age of 65), or in contrast to the past years they contribute totally for their pensions as in OGA.

So the main driving forces behind the ratio of pensions to GDP for the period 2007-2060 is the combined evolution of the support ratio and benefit ratio.

We can observe from figure 1.4, in the Appendix, that the Dependency Ratio affects the Pension expenditure to GDP in an almost linear way. That is because actually population over the age of 64 mainly represent pensioners and population between the ages 15-64 mainly represent actives. The evolution of active population is, every year, mainly a percentage of the “15-64” population, since workers over 64 represent only a small amount of total workers and pensioners emerge, according to the eligibility provisions, on average, over the age of 61. We observe that the change of trend after 2035 is apparent at the Dependency Ratio. We can see this change of trend after 2035 in almost all demographic parameters graphs such as the ratio of pensioners to employees, figure 1.1, coverage ratio, figure 1.2, and also in the ratio of employees to the number of population between ages 15 and 64, figure 1.3.

Nominal pension indexation is generally assumed to be the inflation plus 0.5% i.e. 2.5%. So the real pension indexation is 0.5%. This is generally lower than 75% of the productivity growth, which means that our pension indexing system is not a generous one, what is also obvious from the low benefit ratio. In the next table 13, we present the experience since now of pension indexing, relatively to inflation and GDP growth, which supports our assumption.

Table 13: Statistics of Inflation, Real and Nominal GDP growth

YEAR	2003	2004	2005	2006	2007
Inflation	3,50%	3,00%	3,50%	3,30%	2,90%
Nominal GDP	171.257	185.225	198.611	213.985	228.949
Nominal GDP change	8,67%	8,16%	7,23%	7,74%	6,99%
Real GDP change	5,00%	3,90%	3,90%	4,10%	3,08%
Real GDP	197.636	205.343	213.352	222.099	228.949
Nominal Pension indexation	4%	4%	4%	4%	4%
Real pension indexation	0,48%	0,97%	0,48%	0,68%	1,07%

**Table 3: Factors behind the public pension expenditures between 2007 and 2060
(in percentage points of GDP)**

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
Public pensions to GDP in a starting year *	1.7	3.9	4.4	2.6	0.1	12.4
Dependency ratio	2.1	2.4	4.4	3.8	0.1	12.7
Coverage ratio	-0.9	-0.1	-0.1	-0.1	0.8	-0.4
1/Employment rate	-0.7	0.2	0.0	-0.2	0.1	-0.6
Benefit ratio	1.0	1.3	0.2	-0.8	-0.9	0.8

* The starting year is 2007 for the column 2007-20 and 2020 for the column 2020-30, etc..

In the Part B of the Annex we can see in the figure 1.9 the graph of the replacement ratio, for the baseline scenario. Factors affecting the ratio are the average wage growth, the length of the career, the eligibility conditions and the pension formula. Irregularities in the replacement ratio and in the average award graphs are due to multiplicity of the schemes and thus to different eligibility conditions and pension formulas. Some of the various schemes replacement ratios are shown in Table 4. Also distortions of the Greek pension social security system are also apparent from the large differences in the replacement ratio of each group.

The number of awards is shown on figure 1.11 in the Part B of the appendix. It rises since 2027 and declines there after. This is mainly due to eligibility conditions of “pre 93 s” permit shorter careers for full pension. Average age, in the same figure, follow a reverse course until 2048 and then drops again a little bit. Those changes however are of minor importance since they range from age 61 to age only age 62.4.

The gross salary until 2047 grows on average less than average award, but after 2047 the growth is lower than that of the average award. The result is a mild rise in the replacement ratio until that year and a slight decline afterwards.

Pension formula is generally unchanged, except for early pensions of IKA-ETAM described above that lead to a slight reduction to replacement rates for the subgroup of women parents insurant to IKA-ETAM, after 2008.

The career length is not dynamically changing. Actually the model does not incorporate behavioural situations, when an initially “early” retiree will finally prefer to stay active longer, for ensuring higher pension and thus higher replacement rate. At the year when the eligibility conditions are fulfilled, no matter an early or a full pension they lead to, the active worker will exceed the labour force and become a pensioner.

Table 4: Replacement rate and coverage by pension scheme (in %)

	2000	2007	2020	2030	2040	2050	2060
Social security scheme	:	60.6	67.9	70.7	67.8	70.0	66.5
IKA_ETAM	0.0	84.2	87.1	81.60	76.4	73.7	70.0
OAEE	:	79.8	108.5	123.2	92.0	84.6	85.1
Public Sector	0.0	149.8	130.5	116.0	103.6	112.3	111.2
OGA	:	10.6	11.5	23.4	22.4	19.6	21.0
Rest of the schemes	:	48.2	45.0	38.83	38.2	45.9	44.0
Coverage *	:	100.0	100.0	100.0	100.0	100.0	100.0

* Coverage of each pension scheme is calculated as a ratio of the number of pensioners within the scheme and the total number of pensioners in the country.

Pensioners are expected to rise due to increased life expectancy. The three law reforms however have dealt with the phenomenon by imposing anti-incentives for early, i.e. before the age of 65, retirements. However the impact of every Law separately cannot be measured, except the effect of the most recent one.

On the contrary contributors are expected to drop because of the demographic and the unemployment factors. The combination of the drop in contributors represents a major stress in social security pension system.

The future development of the coverage ratio i.e. of the number of social security pensioners and the number of people at over the age of 64 is shown in figure 1.2. The curve shows a decline since 2030, succeeded by a growth until the end of the projection period, for the reasons analysed earlier in page 10.

The ratio of the number of social security contributors and the total employment is around 100%, since all official workers are insurant to one or more first pillar insurance schemes.

The support ratio is dropping continually until 2048 when it is stabilised to 1. This of course shows the problem of viability of the system, since it should be more than 4, in order to ensure the future viability of any redistributive social security pension system.

Table 5: Number of pensioners and contributors in the Social security scheme (in 1000), population over 65 and total employment (in 1000) and related ratios (%)

	2000	2007	2020	2030	2040	2050	2060
Number of pensioners (I)	2087*	2635	2871	3262	3804	4158	4192
Number of people aged 65+ (II)	1796	2074	2441	2798	3285	3610	3519
Ratio of (I) and (II)	116	127	118	117	116	115	119
Number of contributors (III)	3711*	4608	4856	4691	4443	4210	4107
Employment (IV)	4004	4606	4854	4656	4368	4105	3977
Ratio of (III) and (IV)	93	100	100	101	102	103	103
Ratio of (III) and (I) 'support ratio'	178	175	169	144	117	101	98

*Figures from the 2000 British Government Actuaries study.

There is no accumulation of assets imposed by Law in the Greek social security system. Assets which are invested, under current regulations, is the emerging difference between contributions and outgo. In case of liquidity or financial problems of the scheme and if the state does not finance the deficit, all assets may need to be liquidated to pay the benefits of the insureds.

Table 6: Assets of pension funds and reserves, (% of GDP)

	2000	2007	2020	2030	2040	2050	2060
Public Pension funds	21.4	:	:	:	:	:	:
Of which liquid financial assets, non-consolidated	5.3	:	:	:	:	:	:
Of which liquid financial assets, consolidated	16.1	:	:	:	:	:	:
Occupational pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Private pensions	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All pensions	21.4	0.0	0.0	0.0	0.0	0.0	0.0

- **Sensitivity analysis**

Perhaps the most striking feature of the sensitivity analysis is that the baseline results appear to be particularly robust within the range of assumptions included in the different scenarios. One exception is perhaps the zero migration scenario, which results in the more pronounced increase in pension spending compared to the baseline. This is primarily due to the fact that migrants are an important injection into the labour force, and thus GDP.

Higher labour productivity tends to reduce pension spending, mainly through its positive impact on GDP growth. As indexation schemes are mostly based on prices, higher labour productivity reduces the impact of the benefit ratio on pension

expenditure. As a consequence, higher labour productivity generally leads to reduced pension spending compared to the baseline.

The higher employment rate for older workers has a mitigating effect on expenditure via the coverage ratio; however, this tends to be partly offset by higher replacement rates, due to increased pension rights. Overall, the effect on pension spending is marginally below the baseline.

The higher life expectancy scenario indicates that the total pension expenditure will rise to 24.4 of the GDP until 2060, 0.3 percentage points over the baseline scenario. From figures 3.1 and 3.10 of the Part B of the Appendix we can observe that the number of pensioners and the number of pension awards will also rise after 2040 more than that of the baseline scenario. This effect is due to the increased life expectancy of pensioners not accompanied by any age threshold increase in the eligibility provisions.

**Table 7: Total and public pension expenditures under different scenarios
(Deviation from baseline scenario)**

	2007	2020	2030	2040	2050	2060
Total Pension Expenditure						
Baseline	11.7	13.2	17.1	21.4	24.0	24.1
Higher life expectancy	11.6	13.0	16.9	21.4	24.1	24.4
Higher lab. productivity	11.6	12.9	16.4	20.2	22.3	22.0
Higher interest rate	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Higher emp. rate	11.6	12.8	16.6	20.9	23.5	23.8
Higher emp. of older workers	11.6	12.8	16.5	20.8	23.5	23.8
Zero migration	11.6	13.4	17.8	23.3	27.2	27.7
Public Pension Expenditure						
Baseline	11.7	13.2	17.1	21.4	24.0	24.1
Higher life expectancy	11.6	13.0	16.9	21.4	24.1	24.4
Higher lab. productivity	11.6	12.9	16.4	20.2	22.3	22.0
Higher interest rate	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Higher emp. rate	11.6	12.8	16.6	20.9	23.5	23.8
Higher emp. of older workers	11.6	12.8	16.5	20.8	23.5	23.8
Zero migration	11.6	13.4	17.8	23.3	27.2	27.7

- **Description of the changes in comparison with the 2001 projection**

The 2000 study, in the ratio of total pension expenditure to GDP, apart from pension expenditure included administration costs of the schemes. Due to the difficulty of collecting data from every scheme separately, it was based on statistical data from the Labor Market Survey and not to the data bases of the schemes. These data steam from a sample of 60.000 families.

Unfortunately a complete comparison is not feasible because we only have fragmentarily information and software, of the 2000 valuation.

Table 8: Decomposition of the change (in %) in public pension expenditure to GDP between 2007 and 2050 under the 2001 and 2009 projection exercises

	% Change to 2050	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio
Pension/GDP – 2000 *	10.98	28.9	#N/A	#N/A	#N/A
Pension/GDP – 2006 **	#N/A	#N/A	#N/A	#N/A	#N/A
Pension/GDP – 2009 ***	12.6	12.7	-1.2	-0.7	1.7

* Decomposition period 2000-2050, From the British Actuaries' study of 2000

** Decomposition period 2004-2050, *** Decomposition period 2007-2050.

4. Description of the pension projection model and its base data.

- **Institutional context in which those projections are made.**

The National Actuarial Authority, under its institutional Law, is the organisation which should perform yearly viability studies of the social security system. The International Labor Office (ILO) in collaboration with the National Actuarial Authority has made a projection for IKA-ETAM, OAEE, OGA and Public Sector with 2005 base year. The pension model was transmitted and exists in the NAA's infrastructures. A group of the NAA's personnel was trained during the last two years by the ILO; so as to be able to run current models, change them according to the assumptions and policy scenarios and also to elaborate further analysis of the pension system by analysing actuarially the rest of the Hellenic pension schemes.

For the current, 2008, study the ILO performed a peer review for the four modelled schemes to check whether new assumptions and policy regulations were properly incorporated in the model. A document reporting the result of the peer review is attached in Part E of the Annex.

The rest of the schemes were estimated using a non actuarial technique developed by an external actuarial partner of ILO, Mr George Langi and was applied by Mrs Marianna Papamichail, member of the NAA. Those results have not been examined by a peer review.

So we will refer for the four schemes as "Group1", for the rest as "Group2" and for the loadings as "Group3".

- **Assumptions and methodologies applied**

For the funds of the Group1:

The assumptions used are those given by the AWG at 2007. Other assumptions concern pension indexation, wage growth and members of the schemes projections, which are described in pages 4-6. Further assumptions concern:

- i. The salary and income distribution: They follow a normal distribution in each estimated sub group of men or women of a certain age.
- ii. Entry, exit and pension rates were extracted from the data base of the schemes for the years they were available, more or less three years 2003, 2004 and 2005.
- iii. Past service was also calculated from the historic figures of the members of the funds. Projected past service follows again a distribution fitted to historical data.

- **General description of the ILO model(s)**

The model estimates the revenues and expenses of the future which are based on the method of cohort decomposition by projecting year by year the figures that relate to insurants and pensioners, such as salaries and pensions. Special characteristic of this model is that it uses distributions and not average prices for insurants' longevity and salaries.

The platform of this model is the Microsoft Office Excel and its core is written in Visual Basic for Application. The program's structure being in a modularized form provides a great degree of automatization. This fact ensures the best potential control of processes and its function.

The model also covers the highest security funds IKA -ETAM, OAEE, OGA and Public Sector. Each of the above has developed a separate system of files and archives such as the code VBA. However, these four funds are totally fed by certain common archives like mortality, population, workers, financial figures etc.

In general, for each scheme is applied the following:

The number of active population of IKA-ETAM and OAEE is estimated by applying the coverage rate to projected population by age and sex.

$$\text{Active}(x, t) = \text{Coverage Rate}(x, t) * \text{Population}(x, t)$$

The transition from active to pensioners is simply led by using transition probabilities:

$$\text{New Invalidity Pensioners}(x + 1, t + 1) = \text{Active}(x, t) * \text{Invalidity Rate}(x, t)$$

$$\text{New Old-age Pensioners}(x + 1, t + 1) = \text{Active}(x, t) * \text{Retirement Rate}(x, t)$$

New Survivors Pensioners (x + 1, t + 1) are calculated by a subroutine of the model according to the eligibility provisions of each scheme and mortality.

The financial part of the above transition is calculated by using the assumed acquired credit and past salary. The active population is classified by their acquired past credits and income level. The newly awarded pensions are estimated by applying the eligibility conditions for pensions and the pension formula to all groups of population by credit and salary. Nevertheless, if an active worker stays active for one year, the credit will increase by the contributed period.

The transition from pensioner to pensioner is simulated as follows:

$$\begin{aligned} &\text{Number of Pensioners}(x + 1, t + 1) = \\ &\text{Number of Pensioners}(x, t) * (1 - \text{mortality}(x, t)) + \text{New Pensioners}(x + 1, t + 1) \end{aligned}$$

$$\begin{aligned} &\text{Amount of Pensions}(x + 1, t + 1) = \\ &\text{Amount of Pensions}(x, t) * (1 - \text{mortality}(x, t)) * (1 + \text{indexation}(t)) + \text{Amount of New Pensions}(x + 1, t + 1) \end{aligned}$$

The model is structured in groups of insurants (group files) with different characteristics. These groups, the economic-demographic file and mortality file constitute the input files.

For IKA-ETAM: twelve groups are established according to the first year of insurance (pre – post 1993) and the field of employment (general, arduous and constructions).

For OGA: there are eight groups according to the category of pension (main, basic, additional, and uninsured old-age) and the gender.

For OAEE: There are eight group files, which stem from the consolidation of TAE, TEBE and TSA, according to the gender and each of the above funds.

For the Public Sector employees: six files were established, according to the first year of insurance (pre 1993, between 1983 and 1992, post 1993) and the gender. There are also two files for the militaries and other two files for the pensioners, so as totally are ten files.

The ILO replacement ratio for the new pensioners is calculated by the average awarded pension, which is distributed and the average salaries of the activated insurants. The one presented in the results was especially calculated for the AWG and it only concern the groups of new pensioners (awards).

The model, calculates the correspondingly rates for each category of pension (old-age, disability and survivor), for the normal or minimum pension (old-age and disability) and for the type of survivor pension, depending where it stems from, (actives, old age pensioners, disability pensioners), as well. In general, the same philosophy is followed in every archive of results.

The active insurants' careers are modeled according to the distributions and not the average of figures. Every age has distributions of the service years, which is based on real incidents and the distinction of salaries to low, medium and high. Moreover, there is a density factor for every age, which implies the rate of contributions that is paid, small to younger and high to older. The distribution of the service years changes yearly, according to the absence or not of the active fund and density factor. Salaries are also changed as a consequence from the evolution in financial figures.

It is obvious that there is no particular age of pension. According to the above distributions and eligibility conditions, pensions are awarded at any age. The pension's rates are estimated by the pension formulas being integrated in VBA Code, as are the distributions and eligibility conditions of each scheme. Survivor pensions are given and calculated in the same manner, in relation to the enacted law of each fund.

- **Data used** to run the model.

Preparative to compiling the survey, a great number of statistic data were used. These data resulted from the statistic process of elements about insureds and pensioners individual by individual. The aggregate tables, having resulted from those elements, were used for the preparation of input files separately for each insurance scheme, either by themselves or after smoothing and adjustments.

As follows, the processed elements, which were used for each insurance scheme, are concisely projected:

- **IKA-ETAM** (12 groups in 2001-2005)
 - Number of contributors by number of days credited in the year.
 - Average wage by number of days credited in the year.

- Number of contributors by level of monthly salary.
 - Number of insureds by number of days credited since registered.
 - Number of pensions and total amount paid in the year, according to the kind of pension (full, old-age, reduced old-age, disability, survivors).
 - Number of pensions by level of pension amount and the kind of pension.
 - Number of pension by insurance class and the kind of pension.
 - Number of pensions at the beginning and the end of the year, new pensioners, exits by death, other exits, by the kind of pensions (cohort tables).
 - Monthly average pension at the beginning and the end of the year, for new pensioners, for exits by death, for other exits, by the kind of pensions (cohort tables).
 - Annual average old age pension (full, reduced).
 - Number of disability pension by the ratio of disability (100%, 75%, and 50%).
- **OGA (4 groups)**
 - Number of insureds by number of the registered months in the year and for each insurance class (2005, 2006).
 - Number of insureds by number of the paid months in the year and for each insurance class (2005, 2006).
 - Number of insureds by number of the registered months since register and for each insurance class (2005, 2006).
 - Number of insureds by number of the paid months since register and for each insurance class (2005, 2006).
 - Number of contributors by insurance class (2004, 2005).
 - Average contribution by insurance class (2004, 2005).
 - Average service by insurance class (2004, 2005).
 - Number of contributors by status (continually, active, new entrants etc.).
 - Number of contributors by marital status (2004, 2005).
 - Number of pensions and amount of the pension (with increments) for old-age and disability pension (2004, 2003 and 2001).
 - Number of awards average service and average amount of the pension (with increments) for old-age and disability pension (2003, 2004 and 2005).
 - Number of pensions by level of pension for old-age and disability pension.
 - Number of pensioners for each category (only Basic, Basic and Additional, only Additional, Basic and Main, only Main) (2004,2005)
 - Number of main pensioners by service, including Additional Service.
 - Number of main pension awards by service, including Additional Service (2004, 2005).
 - Number of Additional (not main) pensioners by service (2004, 2005).
 - Number of uninsured old-age pensioners (2004, 2005).

- Number of basic pensions (discrete values) by level of pension.
- **Public Scheme** (10 groups)
 - Number of insureds by years of service (2004, 2005).
 - Number of insureds of municipalities by years of service (2005, 2006).
 - Number of insureds by salary scale and education level (2005, 2006).
 - Number of insureds of municipalities by salary scale and education level (2005, 2006).
 - Number of insureds by hiring age (2005,2006)
 - Number of new entrants for municipalities (2005, 2006)
 - Data for air force insureds, meaning the hiring duty, marital status, salary scale, years at the service, contributors, new entrants and new erases.
 - Number of pensioners and annual amounts of the pension (with allowances) both for each kind of pension (old-age, disability and survivors) and for each category of pension (Civil, Military and War), (2002, 2003, 2004, 2005).
 - Number of awards and average amounts of the pension for each kind of pension (old-age, disability and survivors) and for each category of pension (Civil, Military and War), (2002, 2003, 2004, 2005).
- **OAEF**

The three former sub-funds', TEBE, TAE and TSA plus the new fund's data were required for the valuation. All four funds work on the basis on presumptive earnings.

 - Sex
 - Date of birth
 - Number of protected members
 - Insurance Class
 - Number of contributions in each class
 - Amount of money paid within the year
 - Date of first pension
 - Date of last pension

These data were used in a way different than the rest of the funds, since presumptive earnings and insurance classes allow for an easy tracking of each insured or pensioners throughout the years. Aggregate tables were also made, having always in mind that the insured switch from one class to another every three years, and the sums for contributions and pension percentages earned each year are fixed.

Besides the above data, concerning distributions by age and gender, we have also used aggregate statistic data, which were given by Statistic Departments of the schemes as well as figures of revenues and expenses by Account Departments. In addition,

macroeconomic data and other that refer to the provisions of each scheme such as amounts of salaries, allowances, insurance classes etc.

For the funds of the Group2:

The assumptions used are those given by the AWG at 2007. Other assumptions concern pension indexation, wage growth and members of the schemes projections, which are described in pages 4-6. Further assumptions concern the:

- i. Age distribution of contributors =
IKA-ETAM age distribution of contributors, moved to fit average age.
- ii. Contribution's valuation = number of contributors * contribution.
Number of contributors (x, t) =
 $\text{Contributors}(x,t-1) * [1 + \% \text{IKA-ETAM evolution of contributors}(x, t-1,t)]$
- iii. Contribution (t) =
Average contribution (t-1) * [1+ % Change of the average salary (t-1, t)]
- iv. Age distribution of pensioners = IKA-ETAM age distribution of pensioners, moved to fit average age.
- v. Benefits valuation = pensioners * amount of pension
Pensioners(x, t) =
 $\text{Pensioners}(x, t-1) * [1 + \% \text{IKA-ETAM evolution of pensioners}(x, t-1,t)]$
- vi. Amount of pension (t) = average pension (t-1)* (1+ %pension indexation)

For the funds of the Group3:

There has been a loading on the amount of total contributions of 10.8% and another on the amount of total benefits of 11.0%.

- **Reforms incorporated in the model.**

IKA –ETAM was the scheme that was mainly affected by the reform. Detailed analysis of the past and the reformed legal provisions of IKA-ETAM on eligibility conditions exist in the Part A of the Appendix.

However, due to methodological and time constraints, this study does not incorporate a number of potentially important aspects of the recent reform (Law 3655/2008), including:

- The reduced fragmentation of the system, by limiting the number of funds from 133 to 13, significantly reducing administrative costs and improving monitoring and supervision.
- Financial incentives for extending working lives by up to 3 years past the statutory retirement age and increased disincentives for early retirement.
- The strengthened provisions regarding maternity leave, aimed at facilitating female participation in the labor market.
- The establishment of the Insurance Fund for Inter-generational Solidarity (AKAGE), which will accumulate reserves in order to finance pension payments of social security funds for the years beyond 01.01.2019. Starting 01.01.2009, AKAGE will be funded by:
 - 10% of annual total privatization revenue,
 - 4% of the annual VAT revenue,
 - 10% of total annual receipts from special social resources of Social Insurance Funds, branches or accounts, as described in article 150 in Law 3655/2008.
- The introduction of the Individual Social Security Number, effective from 01.06.2009, allowing, inter alia, for improved expenditure control. The introduction of the Individual Social Security Number, which is expected to lead to increased expenditure control and to assist employment inspection, thus contributing in reducing contribution evasion.

Some of these provisions may be incorporated indirectly within the existing modeling framework and there are plans to proceed in this direction in the future.

Additional information, References

Mylonas, P. and C. de la Maisonneuve (1999), "The problems and prospects faced by pay-as-you-go pension systems: A case study of Greece", OECD Economics Department, Working Paper No. 215.

APPENDIX

Part A: Eligibility provisions for IKA-ETAM, OGA, OAEE and Public sector

Part B: Baseline and scenario graphs

Part C: Overview graph of the Hellenic model used for the 2009 study

**Part D: Overview graph of the ILO model used for the valuation IKA-ETAM, OGA,
OAEE and Public Sector funds**

Part E: ILO, October 2008, peer review document.

APPENDIX

Part A: IKA -ETAM, OGA, PS and OAEE Eligibility provisions

APPENDIX A

ELIGIBILITY CONDITION FOR OLD-AGE, INVALIDITY AND DEATH PENSIONS

FOR

IKA, OGA, OAEI AND THE PUBLIC SECTOR

1. IKA-ETAM

The eligibility conditions for IKA-ETAM, as well as OAKE are divided into 4 main categories, regarding whether the contributor had began being insured before or after 1993, where a major reform changed the eligibility conditioned greatly. The second categorization is according to sex. These four groups of eligibility conditions are different for each of the three groups that comprise IKA-ETAM, General, Arduous and Constructions. The recent reform in 2008 has brought about some important changes in the eligibility conditions for IKA-ETAM, and these are shown in a separate table.

IKA –ETAM

REVISED ELIGIBILITY PROVISIONS AFTER THE RECENT LAW 3655 /2008 & RELEVANT INFORMATION

** Letters in green show the differences of the reform*

IKA is the country's major social security carrier, covering all private sector workers and employees. The number of contributors and pensioners is approximately half of the total population of the social security system, with a tendency for gradual increase in the future. The coverage is compulsory, except for Greeks living abroad and specific self-employed persons that can be insured on a voluntary basis.

Calculation of pensions & conditions of payment

Regulations for those insured before 1.1.1993

General conditions for Pension eligibility

A1. GENERAL CONDITIONS (FULL PENSION)	MALE AGE	FEMALE AGE	Conditions
DAYS OF EMPLOYMENT			
4.500	65	60	
10.000	62	57	Until 31.12.2012
10.000	62	57.5	From 1.1.2013
10.000	62	58	From 1.7.2013
10.000	62	58.5	From 1.1.2014
10.000	62	59	From 1.7.2014 and then
10.000	62	59.5	From 1.1.2015
10.000	62	60	From 1.7.2016 and then
10.500	58	58	Until 31.12.2012
10.500	58.5	58.5	From 1.1.2013
10.500	59	59	From 1.7.2013
10.500	59.5	59.5	From 1.1.2014
10.500	60	60	From 1.7.2014 and then
11.100	NO LIMIT	NO LIMIT	

A2. GENERAL CONDITIONS (REDUCED PENSION) (*)		MALE	FEMALE
4.500 including at least 100 for each of the last 5 years		60	55
10.000 including at least 100 for each of the last 5 years		60	55

B1. ARDUOUS / UNHEALTHY CONDITIONS (FULL PENSION)	MALE AGE	FEMALE AGE	Conditions
DAYS OF EMPLOYMENT			
10.500 and at least 7.500 of these in arduous/unhealthy occupations	55	55	Until 31.12.2012
>>	55.5	55.5	From 1.1.2013
>>	56	56	From 1.7.2013
>>	56.5	56.5	From 1.1.2014
>>	57	57	From 1.7.2014 and then
4.500 and at least 3.600 of these in arduous/unhealthy occupations, including 1.000 (arduous/unhealthy occupations) during the last 13 years	60	55	

B2. ARDUOUS / UNHEALTHY CONDITIONS (REDUCED PENSION) (*)	MALE	FEMALE	Conditions
10.500 and at least 7.500 of these in arduous/unhealthy occupations	53	53	Until 31.12.2012
>>	53.5	53.5	From 1.1.2013
>>	54	54	From 1.7.2013
>>	54.5	54.5	From 1.1.2014
>>	55	55	From 1.7.2014 and then

C. CONDITIONS FOR CONSTRUCTION WORKERS (**)	MALE AGE	FEMALE AGE
DAYS OF EMPLOYMENT		
4.500 and at least 3.600 of these in constructions including 1.000 during the last 13 years	58	53
4.500 in constructions including 500 during the last 13 years	58	53

D1. MOTHERS AND WIDOWERS FATHERS OF UNDERAGE CHILDREN (FULL PENSION)		MALE - FEMALE
DAYS OF EMPLOYMENT		AGE
5.500		55
D2. MOTHERS AND WIDOWERS FATHERS OF UNDERAGE CHILDREN (REDUCED PENSION)		MALE - FEMALE
DAYS OF EMPLOYMENT		AGE
5.500		50
>>		51
>>		52
>>		53
>>		54
>>		55
		Gradual abolishment
		Until 31.12.2009
		From 1.1.2010
		From 1.1.2011
		From 1.1.2012
		From 1.1.2013
		From 1.1.2014

(*) The reduction rate is set at **1/200** for every month short of the age limit for full pension rights. (1/267 for 2008 only)

** In case where construction workers don't use the relative pension conditions, they can use those for arduous/unhealthy occupations.

*** Mothers of underage children who get reduced pension and their amount after reductions is less than the Minimum Pension (as determined each year from state) will receive the Minimum Pension.

Regulations for those insured after 1.1.1993

A1. GENERAL CONDITIONS (FULL PENSION)		MALE	FEMALE
DAYS OF EMPLOYMENT		AGE	AGE
4.500		65	65
11.100		NO LIMIT	NO LIMIT

A2. GENERAL CONDITIONS (REDUCED PENSION) (*)		MALE	FEMALE
4.500 including 750 during the last 5 years		60	60
10.500		55	55

B. ARDUOUS / UNHEALTHY CONDITIONS (FULL PENSION)		MALE	FEMALE
DAYS OF EMPLOYMENT		AGE	AGE
4.500 and at least 3/4 of these in arduous/unhealthy occupations		60	60

C1. MOTHERS AND WIDOWERS FATHERS OF UNDERAGE (FULL PENSION)		
DAYS OF EMPLOYMENT	MALE - FEMALE	Conditions
6.000 with an underage child	55	Until 2012
6.000 and at least 3 children		The age limit of 65 is decreased by 3 years for each child with minimum age limit 50 years
6.000 and at least 3 children		The age limit of 65 is decreased by 2 years for each child with minimum age limit 55 years
		From 1.1.2013

C2. MOTHERS AND WIDOWERS FATHERS OF UNDERAGE CHILDREN (REDUCED PENSION (*))		
DAYS OF EMPLOYMENT	MALE - FEMALE	GRADUAL ABOLISHMENT
6.000	50	Until 2012
>>	51	From 1.1.2010
>>	52	From 1.1.2011
>>	53	From 1.7.2012
>>	54	From 1.1.2013

(*) The reduction rate is set at **1/200** for every month short of the age limit for full pension rights for all pensions from 1.1.2009. (1/267 for 2008 only)

2. OGA

OGA is the fund for farmers, therefore a shrinking one. It provides four types of pensions. The Basic, which is being abolished, the Main which develops normally, the Additional, which has been incorporated into the Main, thus giving the Main-Additional, and the Uninsured over aged, a subgroup of the Basic, not being abolished.

PENSION NAME	LAW	DURATION	Number of pensions per year	CLASS	ADDITIONAL PENSION	BENEFIT COEFFICIENT
	1745/1987	The "additional pension" branch is abolished from the beginning of the "main pension branch" (law 2485/1997) which is its total successor.	14	A B C		

KIND OF BENEFIT: OLD AGE PENSION DISABILITY PENSION ORPHANS PENSION

ELIGIBILITY CONDITIONS	COMMENTS
Eligible for OGA basic pension, at least 5 years insured in the branch since 1993,insured 1 year more from each year after 1993 for years 1994- 1997, year of branch abolishment.	The deceased person is eligible for additional pension at the year of his death. Orphans or disabled descendants get additional pension if and while they are eligible for the basic orphans pension.
Time spent insured in the "additional pension" branch, abolished after 1998, is counting for the "main insurance" branch, after application	For more than 1 descendants, pension amount is divided in equal parts. Each part cannot be less than 6,86 or 13,72 in the case of the death of both parents.

PENSION AMOUNT	MINIMUM PENSION	MAXIMUM PENSION
$= (UWDE) * [(years in class A) * 0,3 + (years in class B) * 0,425 + (years in class C) * 0,55]$	13,72	6,86
	133,21	133,21

PENSION INDEXING	COMMENTS
Decree according annual income policy	Decree according annual income policy
(UWDE): Unspecialised Worker Daily Earnings. Indexed according to the unique collective work contract 23,3 from 1/1/2003	
24,22 from 1/1/2004	
25,01 from 1/9/2004	
25,56 from 1/1/2005	
26,41 from 1/9/2005	

UWDE amount



3. OAKE

OAKE is the fund for the self-employed and is made up of three funds that had their own legislation which is still applicable to Pre 1993 insured, should they wish to receive a pension issued with the old legislation. It becomes obvious therefore, that all old legislation is still taken into account when building the model for OAKE.

OAAE Old-age pension		Contribution requirement		Days of Employment	Years of Employment	Extra condition	Retirement age	Type of Pension		Discount rate for early retirement (PER YEAR)	
Type of occupation	Gender	State	Self-employed					Full	Reduced		
Self - Employed	Both sexes	Pre 1993	-	100%	4.500	15	65	√		12/267	
								√		12/267	
								√		12/267	
								√		12/267	
								√		12/267	
								√		12/267	
		Post 1993	-	100%	7500	25	No limit	No limit	√		12/267
									√		12/267
									√		12/267
									√		12/267
Post 1993	10%	20%	4.500	15	No limit	No limit	√		12/267		
							√		12/267		
Post 1993	10%	20%	6000	20	for mothers with at least 3 children with the years being reduced to 3 years for every extra child, not more than 50 years old.	55	√		12/267		
							√		12/267		
Post 1993	10%	20%	6000	20	for mothers with at least 3 children with the years being reduced to 3 years for every extra child, not more than 50 years old.	50	√		12/267		
							√		12/267		



OAAE Invalidity Pension		THE LILA BOXES REFER TO POST-93 ONLY									
Gender	Pre/Post 1993	Type of occupation	Days of Employment	Years of Employment	Extra Condition/Days of Employment/last 5 years	Amount granted	Minimum pension				
							2004	2005			
Both Sexes	Pre+Post 93	Common illness	4.500	15	-	50%, 75%, 100% of old-age pension depending on whether the person is found to be partially invalid, or heavily invalid.					
			300+ 120(x-21), where 21 ≤ x ≤ 54	1+0,4(x-21), where 21 ≤ x ≤ 54	300						
			1.500		600						
				Industrial accident	0 needed	0		The Invalid with psychological disorders get 100% instead of 75% and the Partially Invalid with p.d. get 75% instead of 50%, if pd stems from work.			
				Non-Industrial accident (=common illness/2)	2.250	7,5	-				
					150+ 60(x-21), where 21 ≤ x ≤ 54	0,5+0,2(x-21), where 21 ≤ x ≤ 54	300				
					750	2,5	600				

This colour depicts slight differences between Pre and Post 93

OAAE Death Pension Calculation Matrix

Gender	Pre/Post 1993	Days of Employment	Years of Employment	Extra Condition/Days of Employment/last 5 years	Type of relation	Alternative Conditions	Amount granted			
Male+Female	Pre+Post 93	Death	4.500	15	-	Spouse	50% before they become 65, 70% (continues with 50 for post-93) after that			
			300+ 120(x-21), where 21 ≤ x ≤ 54	1+0,4(x-21), where 21 ≤ x ≤ 54	300					
			1.500		600					
				0 needed	0		Underage children	Up to 24 if they are studying, for as long as the invalidity lasts, should they have some kind of invalidity	20%(25% for post 93) for each child, 60% (50% for post 93) if it has no parents	
		Industrial accident	2.250	8	-	Ancestors and descendants provided they were taken care of by the deceased and are orphaned				20% for the father or (non-widow) mother, 40% for widow mother.
		Non-Industrial accident (=common illness/2)	150+ 60(x-21), where 21 ≤ x ≤ 54	0,5+0,2(x-21), where 21 ≤ x ≤ 54	300					
				750		600	Ex-Spouse(has to be over 65 and to have been married for at least 15 years, be single at time of application, not receive more than 2828 € annually)			

The following rows stand for each of the previous categories

TEBE Old age pension		Pre/Post 1993		Days of Employment		Years of Employment		Extra condition		Retirement age		Type of Pension		Discount rate for early retirement (PER YEAR)	
Type of occupati	Gender	State	Self-employed	Days of Employment	Years of Employment	Extra condition	Retirement age	Full	Reduced						
Self - Employed	Both sexes	Pre 1993	10%	20%	4.500	15		65	√		12/267				
					10.500	35		60	√		12/267				
					11.100	37		No limit	√		12/267				
					7500	25		for mothers with at least 80% disabled children or spouses whose spouse is at least 80% disabled and has been married for 10 years	√		12/267				



TEBE Invalidation pension							
Gender	Pre/Post 1993	Type of occupation	Days of Employment	Years of Employment	Type of Pension		Extra Condition/Days of Employment immediately before stopping work
					Full	Reduced	
Both Sexes	Pre 93	Common illness	6.000	20	√		-
			3.000	10	√		if the age they joined TEBE is >50 they need 15 years
		Industrial accident	0 needed	0	√		-
		Non-Industrial accident (=common illness/2)	1.500	5	√		-
			2.250	7,5	√		-

TEBE Death pension									
Gender	Pre/Post 1993	Days of Employment	Years of Employment	Type of relation	Alternative Conditions	Amount granted	Extra condition		
Male+Female	Pre 93	3.000	10	Spouse		70%	It is stated that the sum of money awarded to the widow/widower cannot be more than 100% of the deceased person's pension. If there is now widower or widow left behind (only children) the sum must not exceed 80%. If there are no widow/widower and children left, but we have grandparents and grandchildren, the sum must not exceed 100%. In all cases, all pensions are awarded accordingly, by lowering the percentages for each eligible member respectively, but children and widow/widower are appointed their pension as a whole if they co-apply with grandparents/grandchildren.		
			20						
		0 needed	0	Underage children	Up to 24 if they are studying, for as long as the invalidity lasts, should they have some kind of invalidity	20% for each child, 60% for a child that has no parents			
		1.500	5	Ancestors and descendants provided they were taken care of by the deceased and are orphaned		30% for the father or (non-widow) mother, 60% for widow mother.			
		2.250	7,5						
						The following rows stand for each of the previous categories			

TAE Old-age pension									
Type of occupation	Gender	Pre/Post 1993	Days of Employment	Years of Employment	Retirement age	Type of Pension			
						Full	Reduced		
Self - Employed	Male & Female	Pre 1993	4.500	15	65	√			
			10.500	35	60	√			
			11.100	37	No limit	√			

TAE Invalidity					
TSA Invalidity					
Gender	Pre/Post 1993	Type of occupation	Days of Employment	Years of Employment	Extra Condition/Days of Employment immediately before stopping work
Both Sexes	Pre 93	Common illness	6.000	20	-
			3.000	10	900
		Industrial accident	0 needed	0	-
		Non-Industrial accident (=common illness/2)	1.500	5	300
			2.250	7,5	-

TAE Death Pension

Gender	Pre/Post 1993	Days of Employment	Years of Employment	Extra Condition/Days of Employment immediately before stopping work	Type of relation	Alternative Conditions	Amount granted	Extra condition
Male+Female	Pre 93	6.000	20	-	Spouse		70% if he/she is the only beneficiary, 60% if not.	It is stated that the sum of money awarded to the widow/widower cannot be more than 100% of the deceased person's pension. If there is now widower or widow left behind (only children) the sum must not exceed 80%. If there are no widow/widower and children left, but we have grandparents and grandchildren, the sum must not exceed 100%. In all cases, all pensions are awarded accordingly, by lowering the percentages for each eligible member respectively, but children and widow/widower are appointed their pension as a whole if they co-apply with grandparents/grandchildren.
					Underage children	Up to 24 if they are studying, for as long as the invalidity lasts, should they have some kind of invalidity	20% for each child, 60% for a child that has no parents	
		0 needed	0	-	Ancestors and descendants provided they were taken care of by the deceased and are orphaned		30% for the father or (non-widow) mother, 60% for widow mother.	
					Industrial accident			
		1.500	5	300	Non-Industrial accident (=common illness/2)			
						2.250	7,5	-

Pre 93

TSA Death Pension

Gender	Pre/Post 1993	Days of Employment	Years of Employment	Extra Condition/Days of Employment/last years	Type of relation	Alternative Conditions	Amount granted	Extra condition
Male+Female	Pre 93	3.000	10	300	Spouse	Up to 24 if they are studying, for as long as the invalidity lasts, should they have some kind of invalidity	70% if he/she is the only beneficiary, 60% if not.	It is stated that the sum of money awarded to the widow/widower cannot be more than 100% of the deceased person's pension. If there is now widower or widow left behind (only children) the sum must not exceed 80%. If there are no widow/widower and children left, but we have grandparents and grandchildren, the sum must not exceed 100%. In all cases, all pensions are awarded accordingly, by lowering the percentages for each eligible member respectively, but children and widow/widower are appointed their pension as a whole if they co-apply with grandparents/grandchildren.
			15	-			20% for each child, 60% for a child that has no parents	
		0 needed	0	-	Underage children			
		1.500	5	300				
		2.250	7,5	-				

The following rows stand for each of the previous categories

TSA Old-age pension													
Type of occupation	Gender	Pre/Post 1993	Days of Employment	Years of Employment		Retirement age	Type of Pension		Discount rate for early retirement (PER YEAR)				
							Full	Reduced					
Self - Employed	Male	Pre 1993	4.500	15	ΠΔ 669/1981	65	√						
			10.500	35		60	√						
			7.500	25				√		12/200			
			11.100	37		No limit	√						
			4.500	15		65	√						
			7.500	25		60	√						
	Female	Pre 1993	7.500	25	ΠΔ 669/1981	58			√				
			11.100	37		No limit	√						

4. Public Sector

The Public Sector has numerous groups which have stemmed from all the major and minor changes in the legislation for each type of group working for the state. Major law reforms were M.D 167/2007,L.3029/2002,L.2084/1992,L.3513/2006,L.3408/2005,L.3620/2007.

National Actuarial Authority, Report

For the November 2008 WGA study on pensions

Appendix A: Eligibility Conditions

Categories	Enrolled until 1992 and vesting 15 years of service until 1997						Enrolled until 1992 and vesting men: 25 years or women: 15 years of service after 1997						Enrolled from 1993 to 1992				Enrolled 1993 and after						
	Vesting year	Past service	Age threshold	Years of service without any age threshold	Age when pension is due		Vesting year	Past service	Age threshold	Years of service without any age threshold	Age when pension is due		Vesting year	Past service	Age threshold	Years of service without any age threshold	Age when pension is due	Past service	Age Threshold	Years of service without any age threshold	Age when pension is due		
Women with undecorated or over 50% disable children or over 87% disable husband	1992	15	42																				
	1993	15.5	42.5															20	55				
	1994	16	43											2.5	60								
	1995	16.5	43.5			17.5	60																
	1996	17	44																				
	1997	17.5	44.5																				
		15	60					15	60					15	60			15	60				
		15	60					17.5	60					25	60			20	50				
		15	60		60			15	55					15	55			15	50				
		5						5						5				20	60				65
Mothers with 3 or more children																							



CIVIL SERVANTS SURVIVOR

CASES	Requirements		Amount of pension	
	Requirements	Amount of pension	Requirements	Amount of pension
Enrolled until 1992 if the descendant has 1. vested a pension right 2. died after 5 years of service for reasons outside service (or 10 years in the last case) 3. died for in service reasons. Otherwise persons in cases receive an allowance equal to (number of years of service)/(the descendants' last monthly salary)				
Widow or Widower	Widow with no other requirements and Widower poor with at least 65% disability with 2 children at the most	7/10 * of the pension	Widow or Widower with at least one year of marriage with the descendant, poor (average income from any source less than 40*(UWDE) with 20% more for every child) or with at least 67% disability	50% of the pension
Widow (or Widower, See above) and, or at least 3 children: UNMARRIED DAUGHTERS (18-24 after 1992) - for lifelong if they are over 66% disabled and if they their monthly income is less than 40*UWDAE otherwise they get 1/3 of the original amount if income < 60*UWDE or 1/2 for income >=60*UWDE after their growing up age and UNMARRIED SONS under 18 and 24 if they study (unless they have over 50% disability they continue to receive pension)	If a the underaged child marries or dies or disappears his/her pension is divided in equal parts for the rest of the family If the child is not underaged and also Fathers' family takes a part of the pension	For 3 and over children plus 1/10 max 3/10 if there is widow if not max 10/10 For 3 and over children plus 1/10 max 3/10 if there is widow if not max 10/11	every child	25% of the pension
The divorced daughter if she has an income less than the minimum public pension (and many other prerequisites). This right has been stopped for women born after 1945	if the child is not underaged and the widow has died and also Fathers' family takes a part of the pension if the child is not underaged and there is widow only (and not father's family)	min(3,5/10 for 50% disability, 7/15 for 60% disability and 7/10 for over 80% disability- any other public allowance:0) widow : 0.5 of the pension, childs 0.5 of the pension into equal parts	every orphan of both parents	50% of the pension
DESCENDANT'S FATHER FAMILY PENSION 1: Of the widows' with children and to the widow's without children the father of the descendant and his unmarried sisters, if all mentioned are poor, can take a part of the widower pension. They can of course choose to leave their part to the widow and the children.	if the widow has no children if the widow has children Η σύνταξη του πατέρα συνίσταται στα 3/10 ΕΚΕΙΝΗΣ ΠΟΥ ΘΑ ΕΠΙΘΥΜΕ ΕΚΕΙΝΟΣ ΠΟΥ ΠΕΘΑΝΕ. Στην περίπτωση που και οι δύο γονείς έχουν δικαίωμα σύνταξης, η σύνταξη κατανέμεται μεταξύ τους σε ίσες μερίδες.	1/4 of the widows' pension 1/6 of the widowers pension		
DESCENDANT'S FATHER FAMILY PENSION 2: If the descendant has at least 10 years of past service and was unmarried or widower without children: 1. His father if he is over 65 without income or 2. If his father is not in life his poor widow mother and poor sisters	Poor father's pension Poor mother's and sisters' pension	3/10 of the pension mother 1.5/ 10 of the pension, sisters 1.5/10 of the pension in equal parts		
In all above pensions 1. smoothing allowance, 2. family allowance are also added but the upper limit of all families pension cannot exit the descendants' pension				



CIVIL SERVANTS INVALIDITY

	Enrolled until 1992		Enrolled from 1993 and on	
	Past service for vesting right	Pension amount	Past service for vesting right	Pension amount
At least 67% disability,	15	max{80%*(pensionable salary), OA pension formula +disability allowance}	15	max{80%*(pensionable salary), OA pension formula +disability allowance}
Accident or illness due to reasons outside service	4.5	OA pension formula for at least 5 years of past service. If past service is less than 5 years he takes a lump sum = (Number of real years of service)*(monthly salary)	4.5	OA pension formula for at least 5 years of past service. If past service is less than 5 years OA pension formula is calculated with the average the total months of service prior to exit
	4.5	OA pension formula for at least 5 years of past service. If past service is less than 5 years he takes a lump sum = (Number of real years of service)*(monthly salary)	2.25	OA pension formula for at least 5 years of past service. If past service is less than 5 years OA pension formula is calculated with the average the total months of service prior to exit
Accident or illness due to reasons during service	-	max{a%*(pensionable salary for 35 years of service), OA pension formula +disability allowance}+ (b%+c%)*(basic surgent's salary)	-	a%*(pensionable salary for 35 years of service) +77 (1991)

Note

To any pension family and smoothing allowance is added where it is not included in the formula

disability percentage	b%	c%
25-45%	2%	
50-55%	2.5%	
60-65%	3%	
70-75%	3.5%	
80-95%	4%	2%
100%	4.5%	27.25%

Part B: Baseline and sensitivity scenarios graphs

FIGURE 1.1

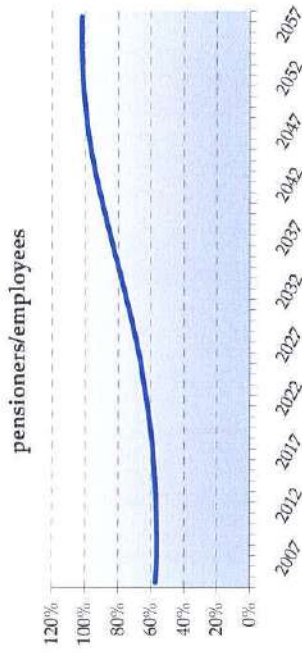


FIGURE 1.2

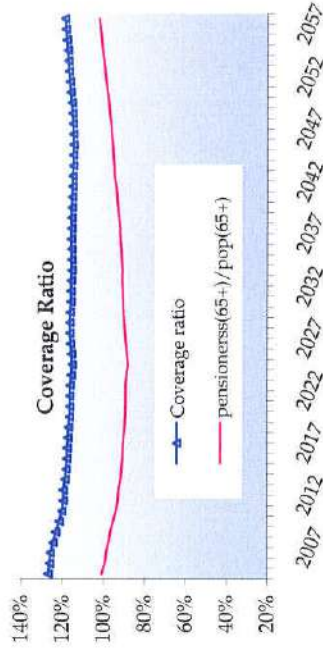


FIGURE 1.3

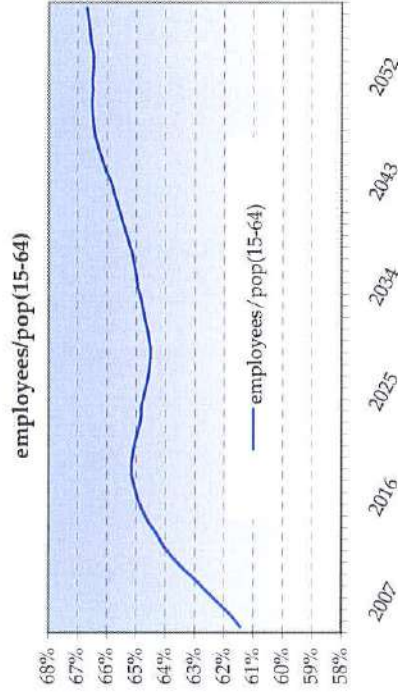


FIGURE 1.4

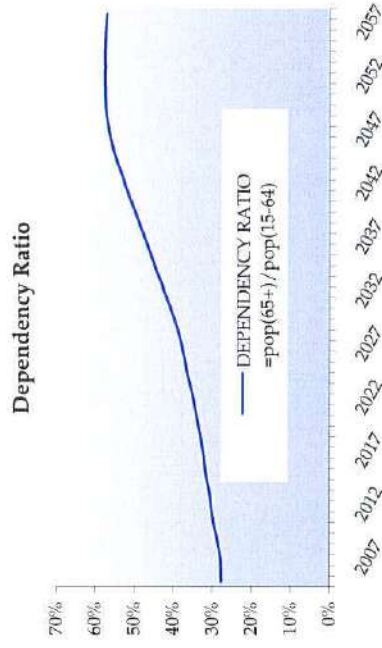


FIGURE 1.5

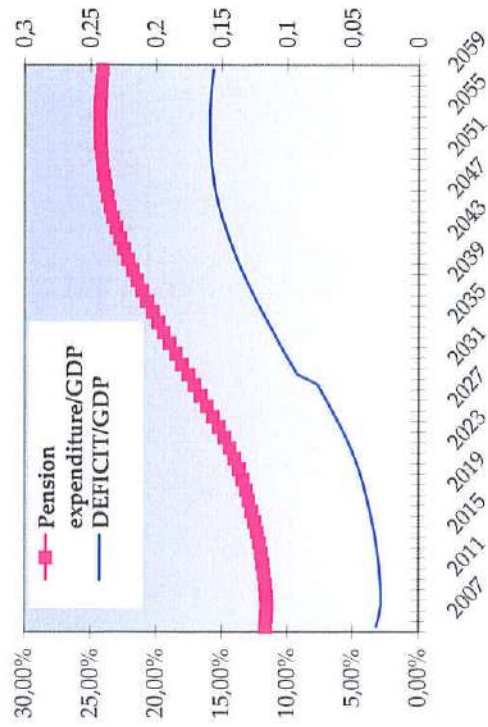


FIGURE 1.6

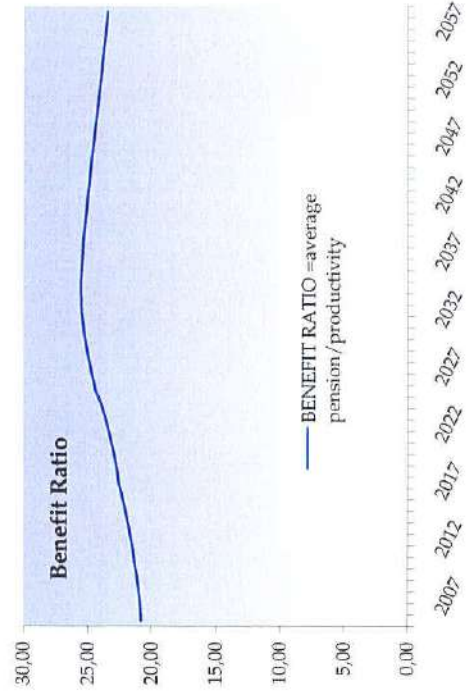


FIGURE 1.7

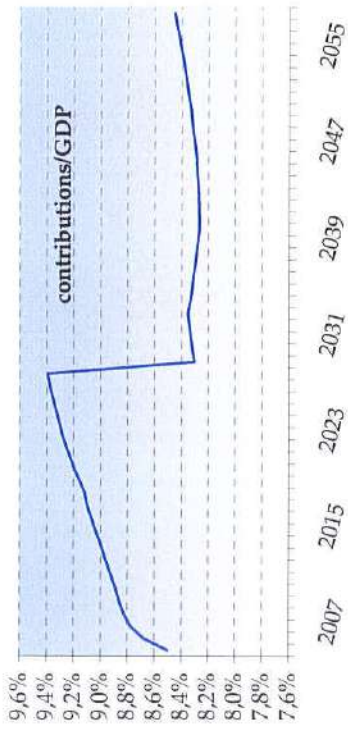


FIGURE 1.8

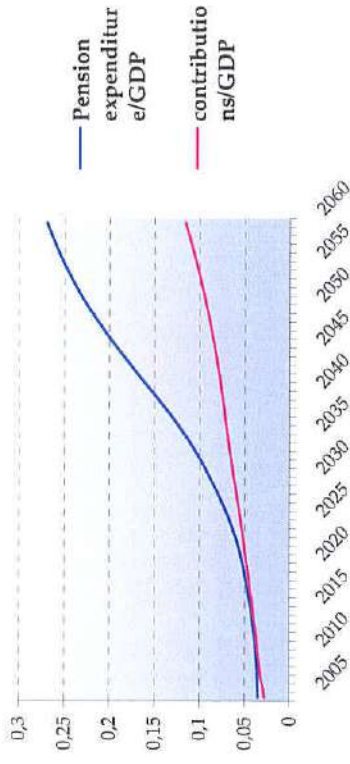


FIGURE 1.9

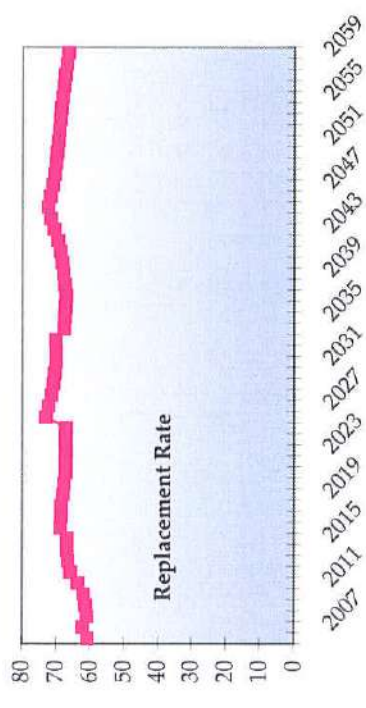


FIGURE 1.10

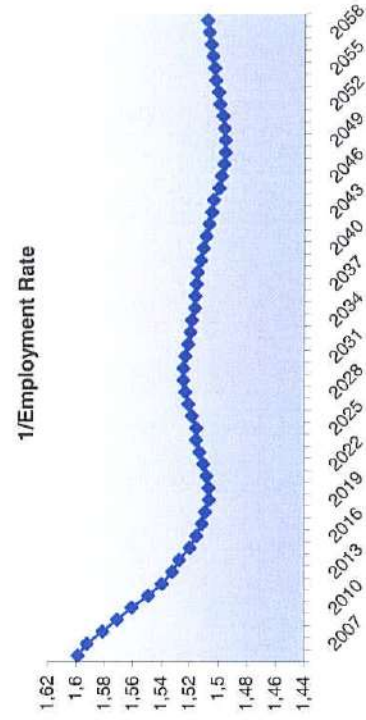


FIGURE 1.11

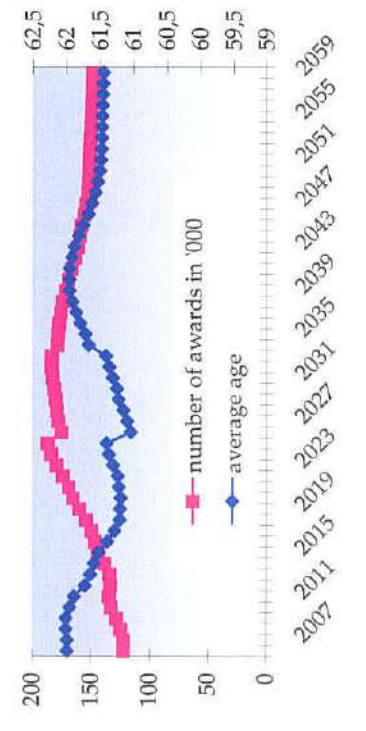
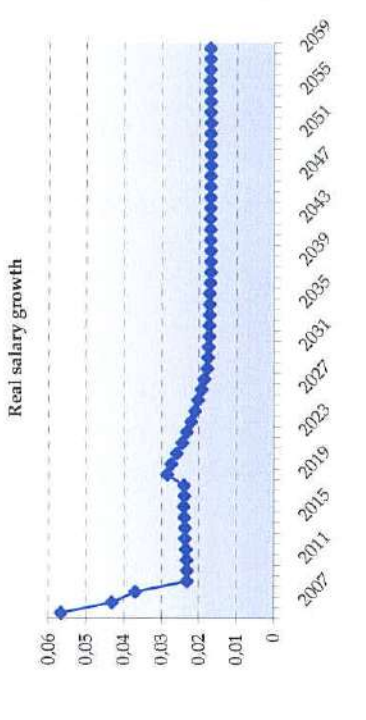


FIGURE 1.12



HIGH LABOR PRODUCTIVITY

FIGURE 2.1

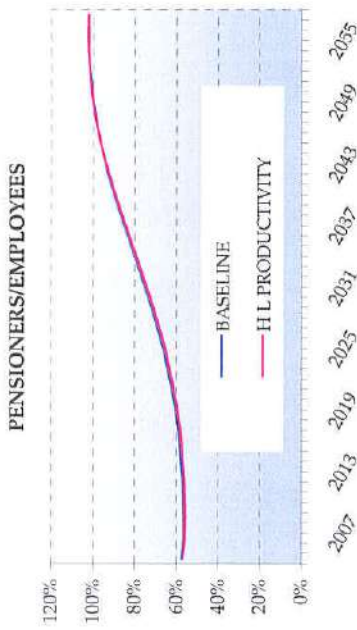


FIGURE 2.2

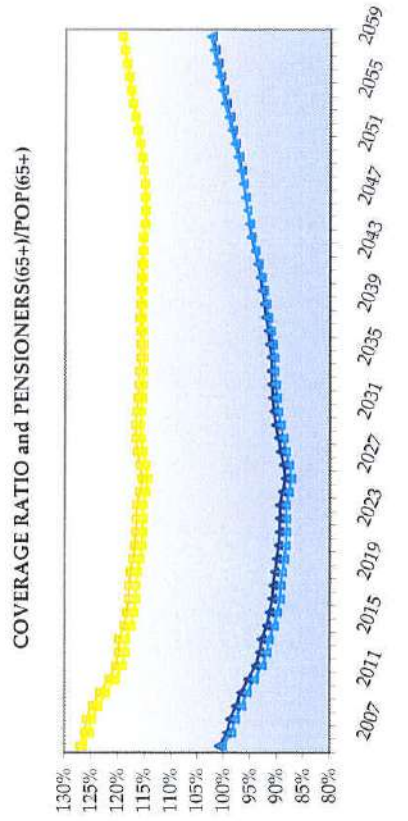


FIGURE 2.3

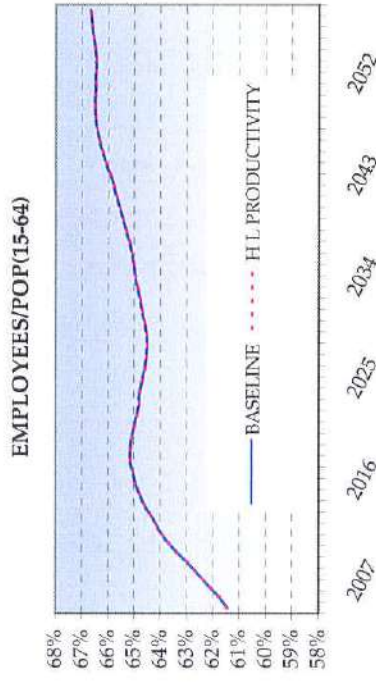


FIGURE 2.4

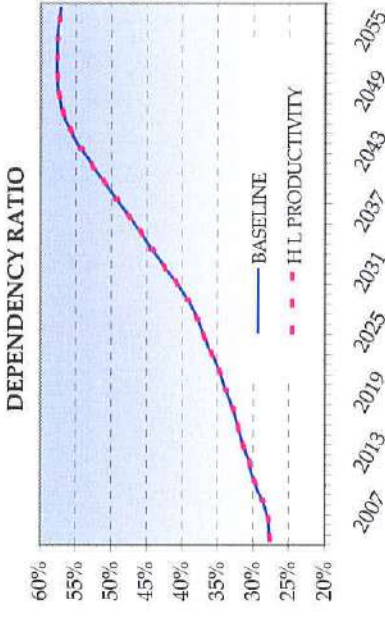


FIGURE 2.5

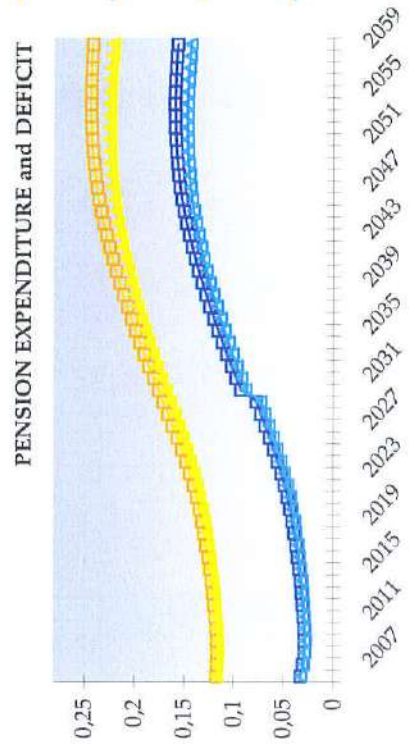


FIGURE 2.6

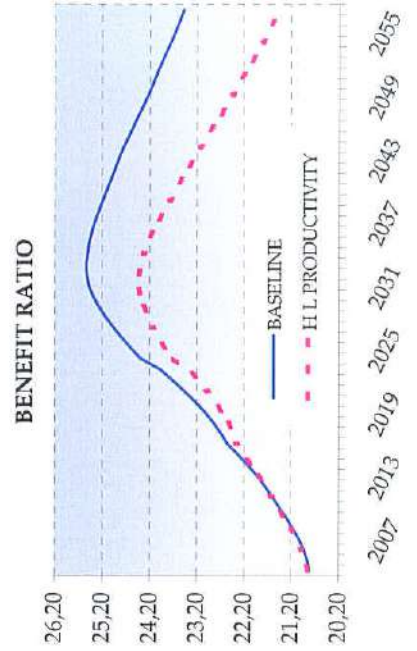


FIGURE 2.7

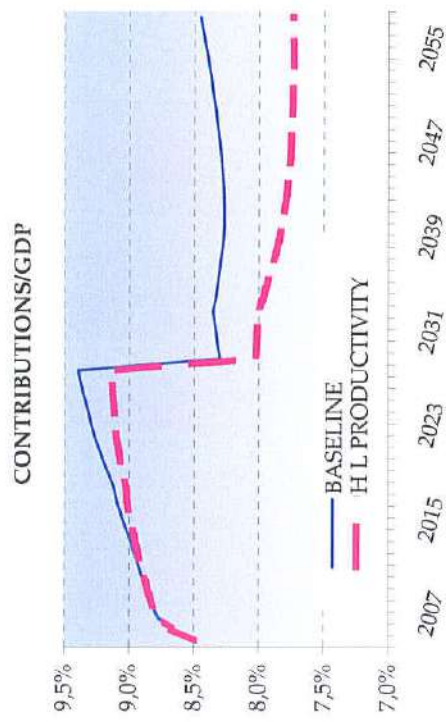


FIGURE 2.8

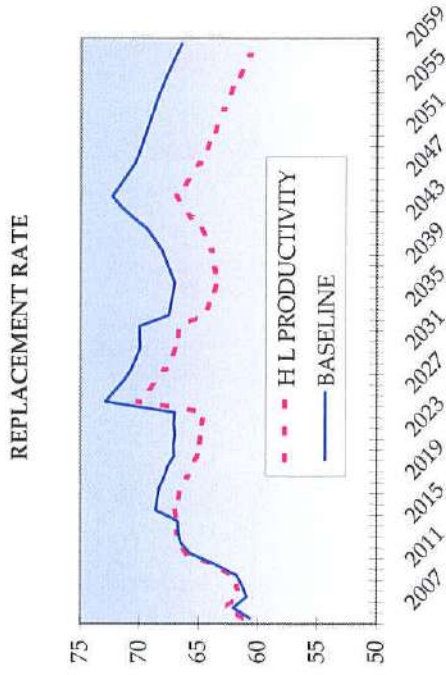


FIGURE 2.9

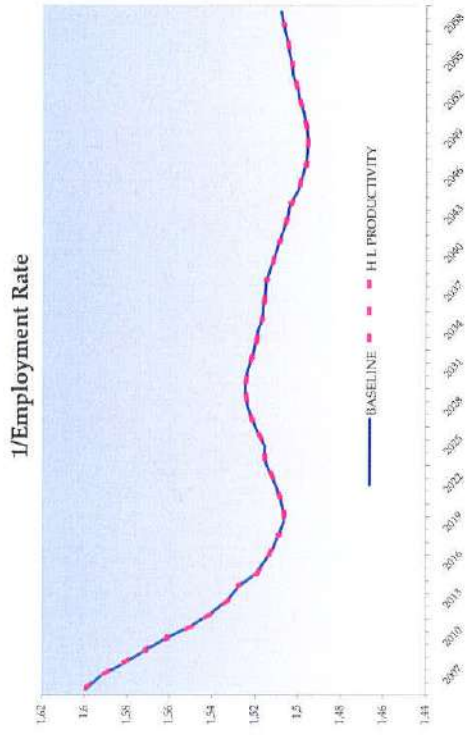
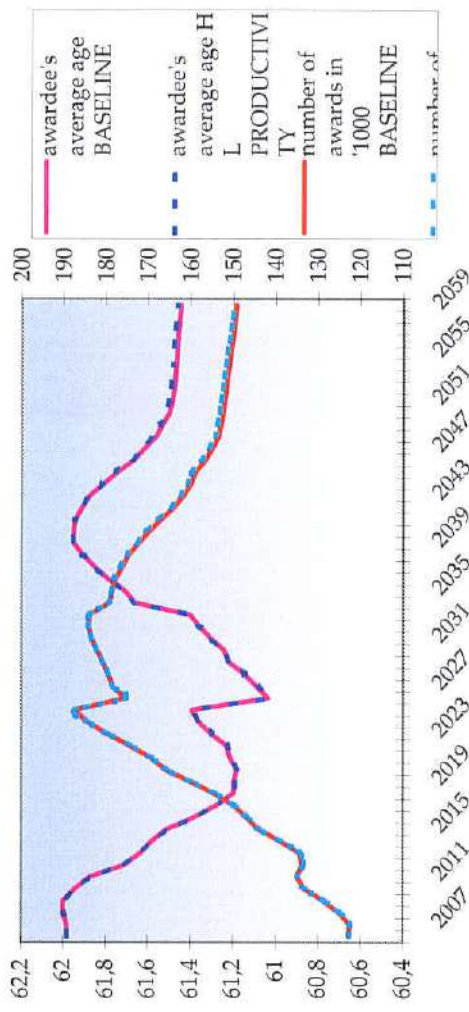


FIGURE 2.10



HIGH LABOR PRODUCTIVITY

FIGURE 2.11

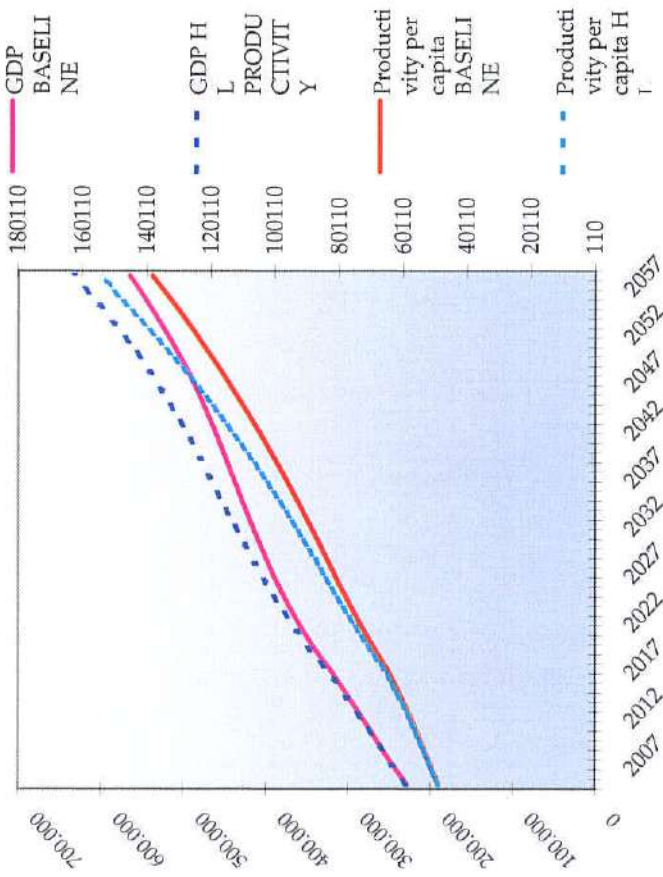


FIGURE 2.12

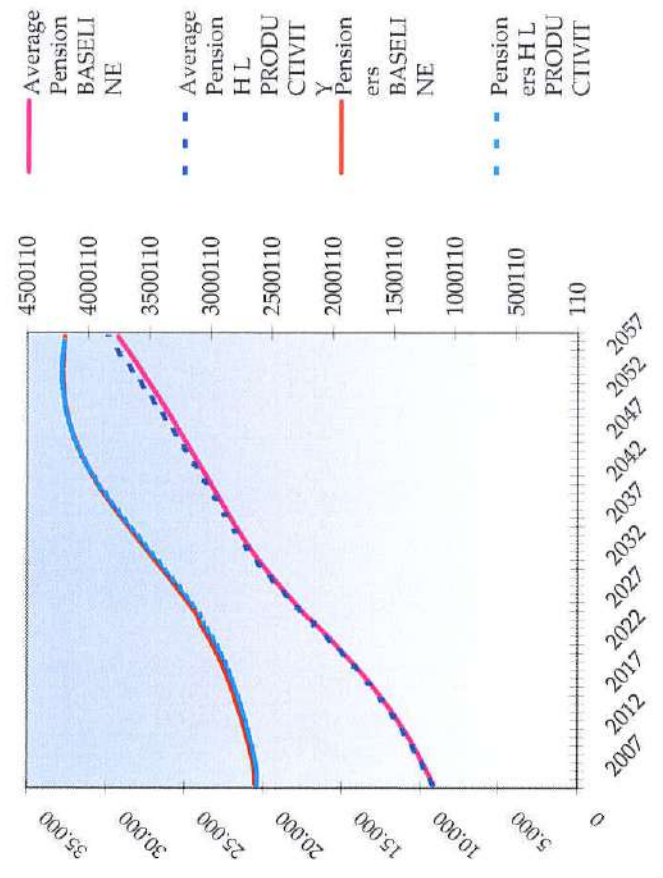


FIGURE 2.13

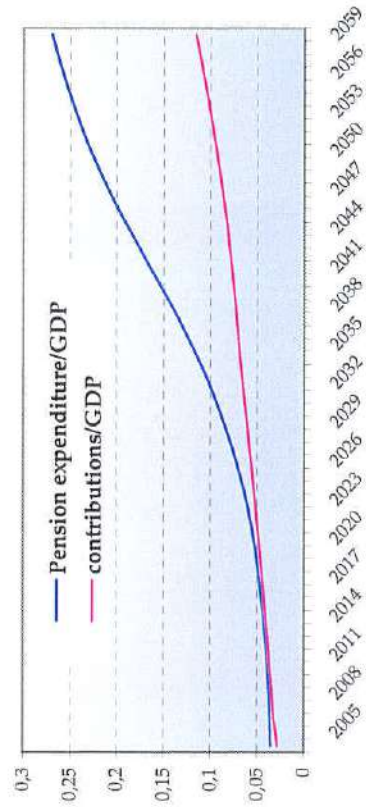


FIGURE 3.1

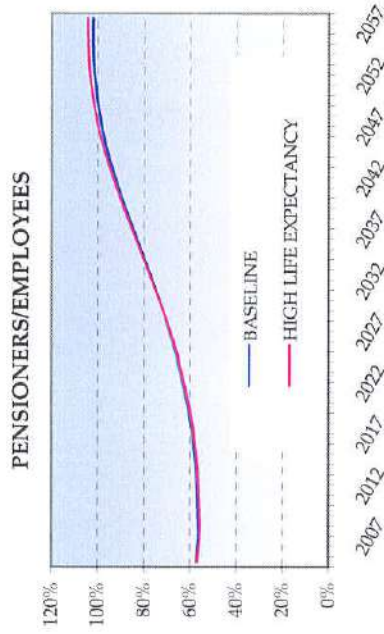


FIGURE 3.2

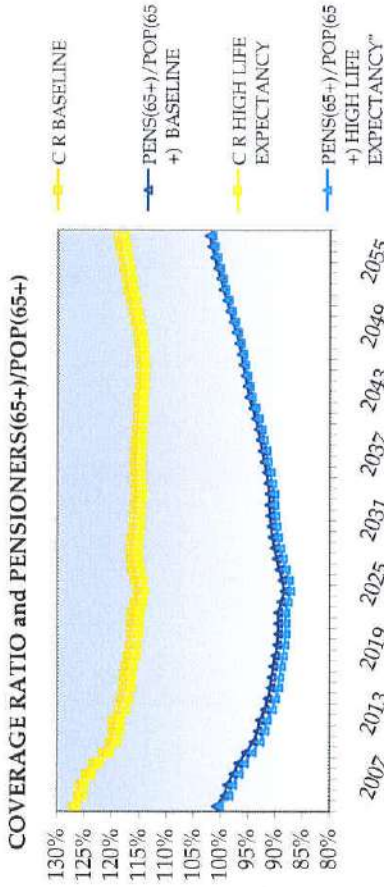


FIGURE 3.3

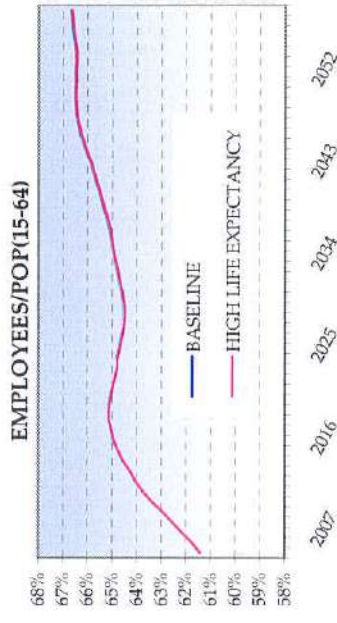


FIGURE 3.4

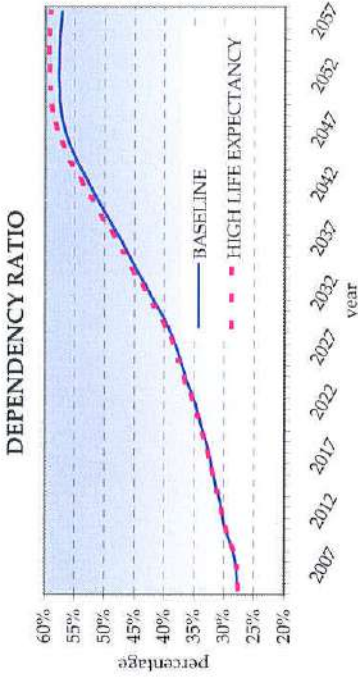


FIGURE 3.5

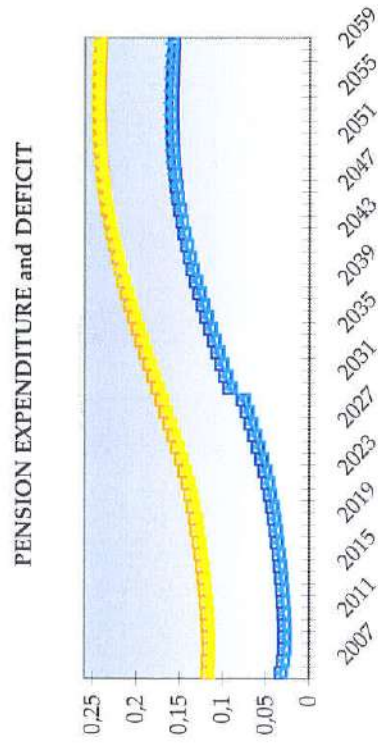


FIGURE 3.6

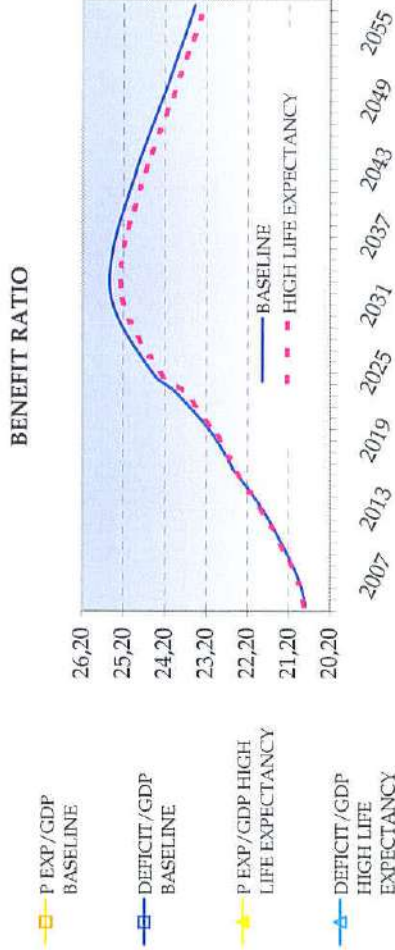


FIGURE 3.7

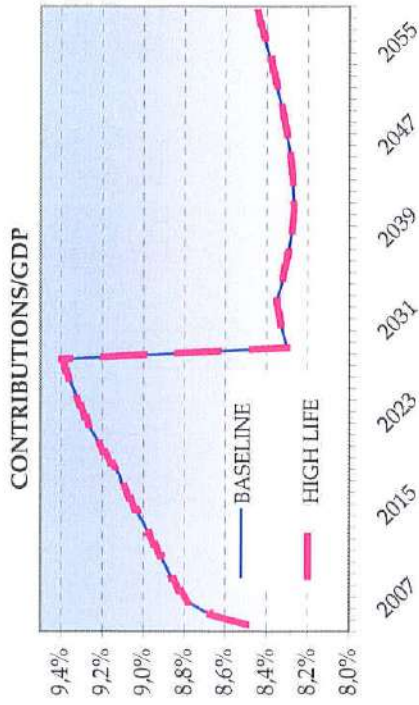


FIGURE 3.8

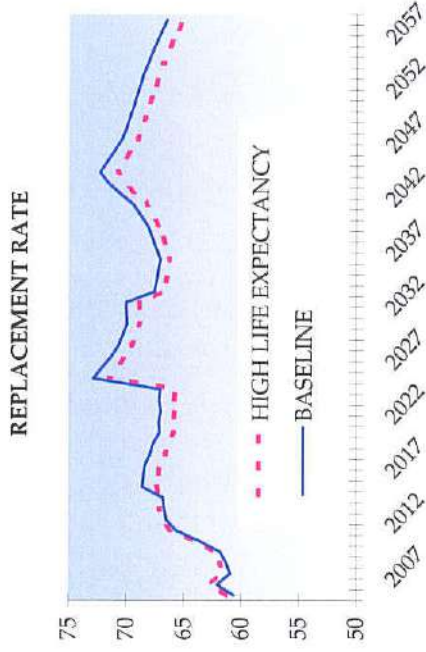


FIGURE 3.9

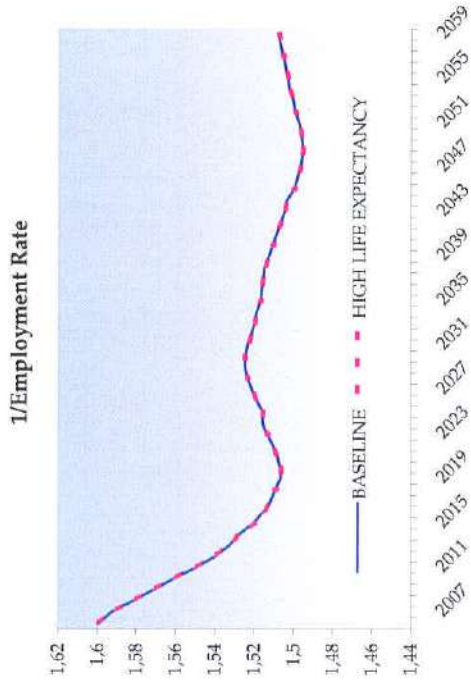
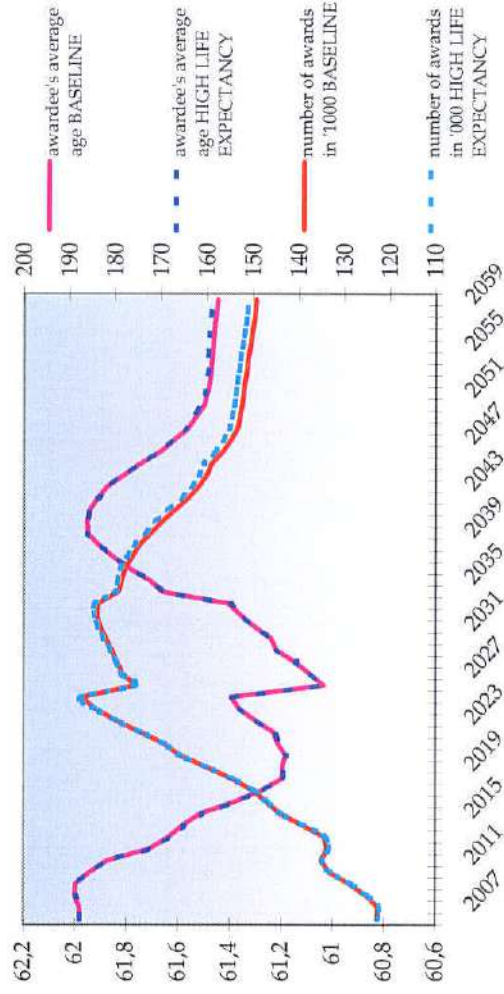


FIGURE 3.10



HIGH LIFE EXPECTANCY

FIGURE 3.11

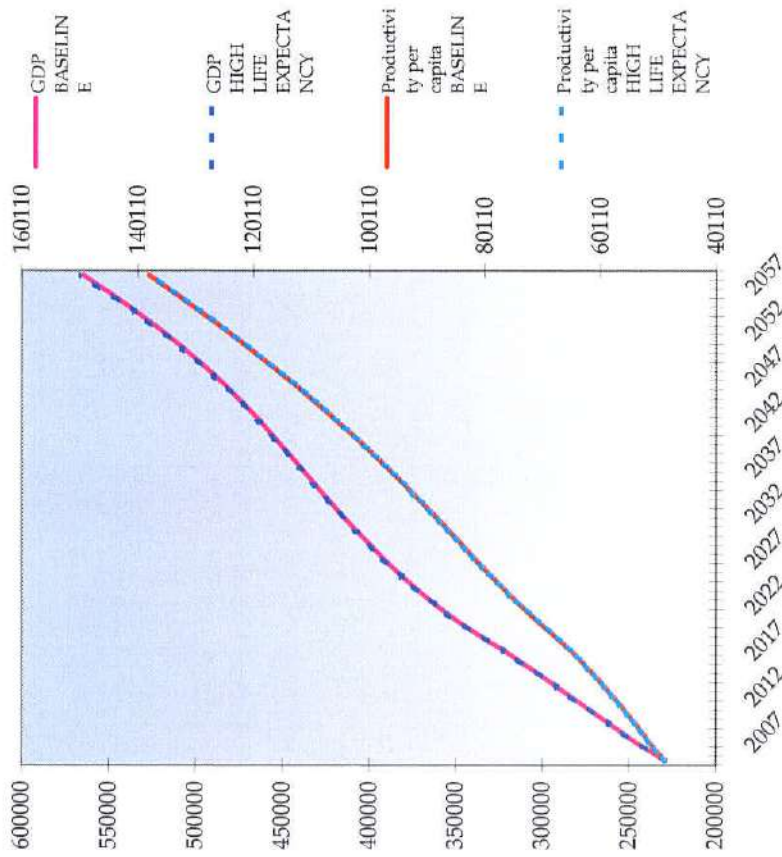


FIGURE 3.12

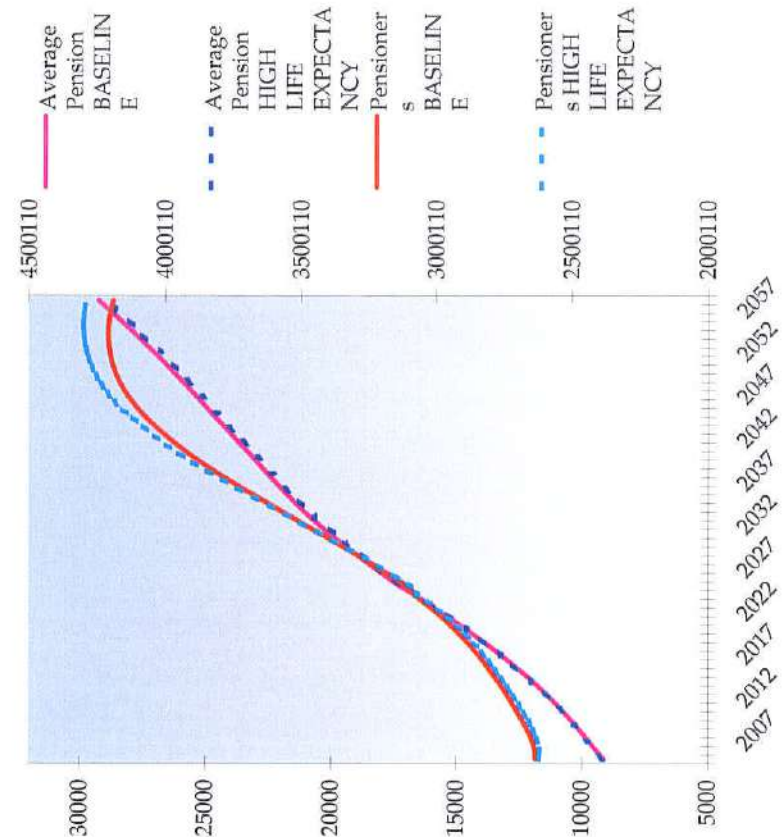


Figure 3.13

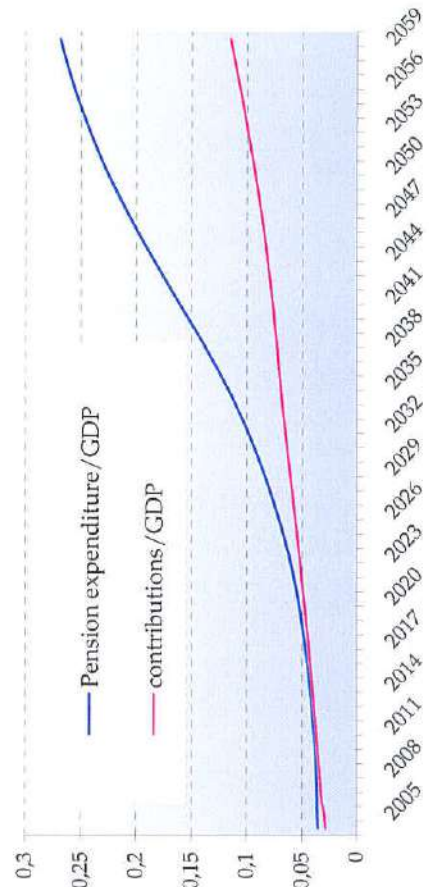


FIGURE 4.1

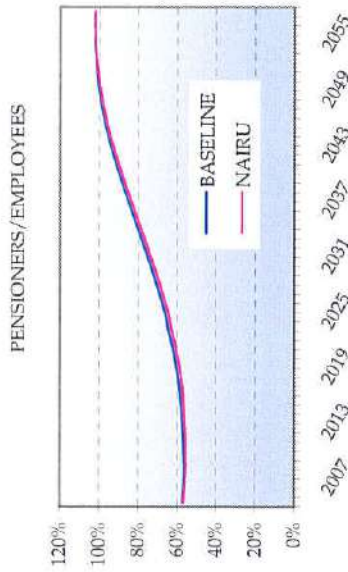


FIGURE 4.3

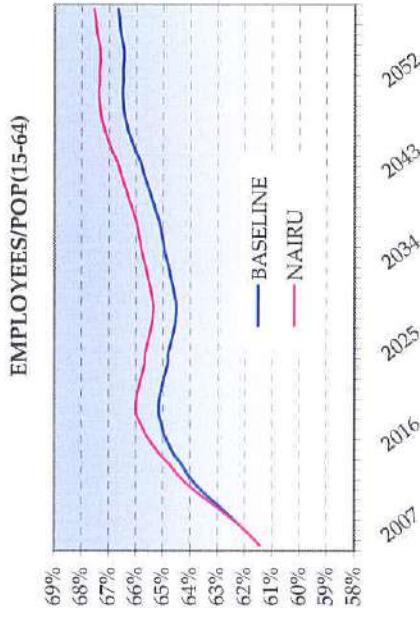


FIGURE 4.5

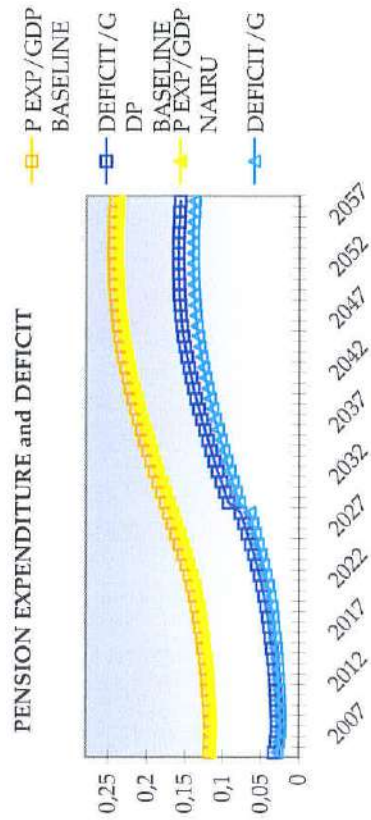


FIGURE 4.2

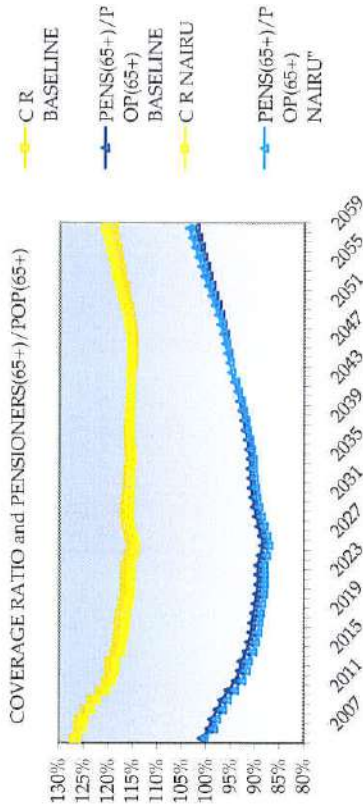


FIGURE 4.4

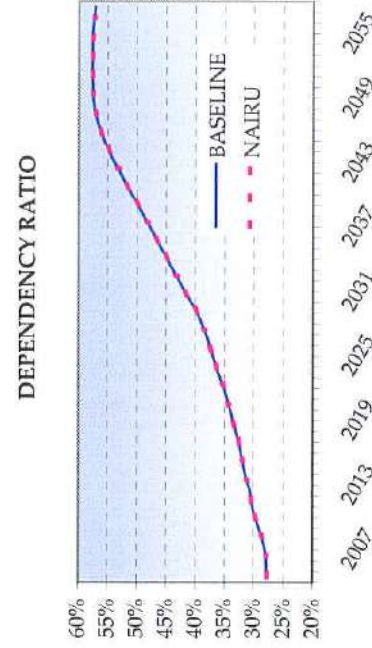


FIGURE 4.6

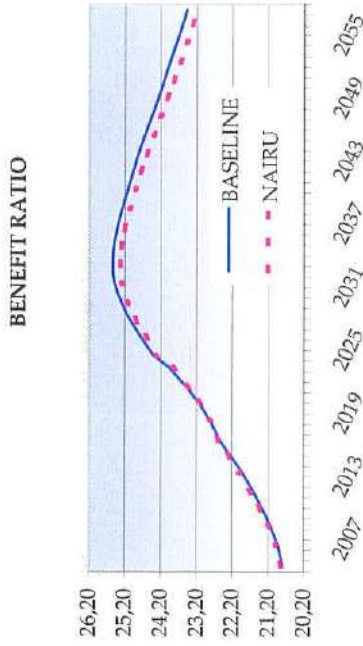


FIGURE 4.7

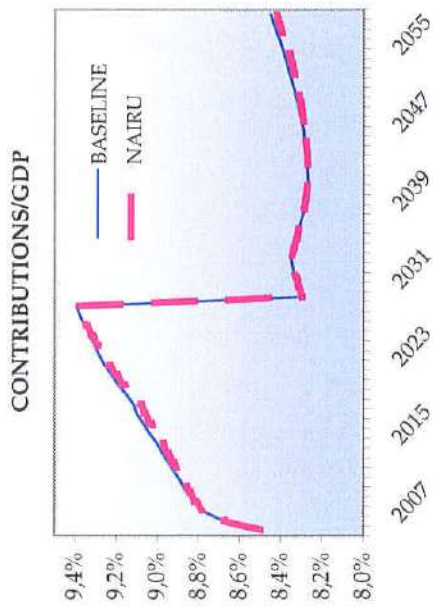


FIGURE 4.8

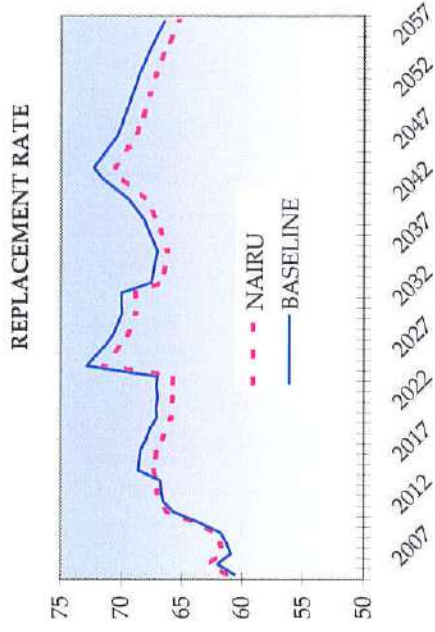


FIGURE 4.9

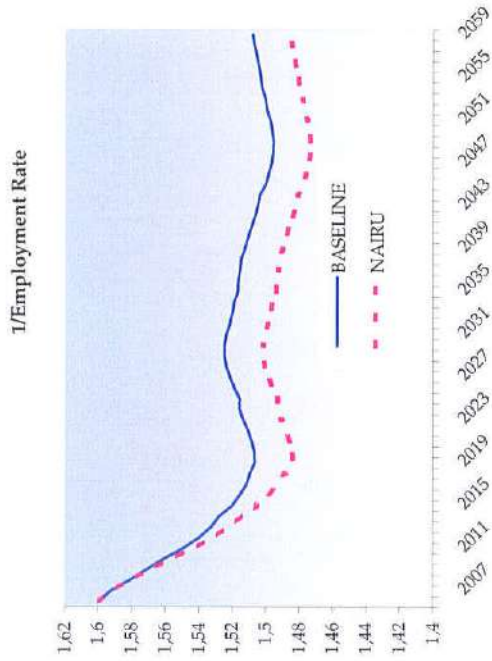


FIGURE 4.10

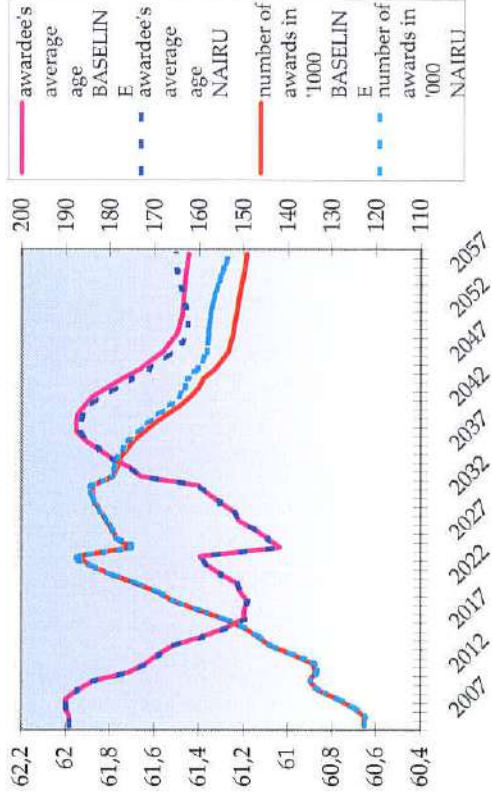


FIGURE 4.11

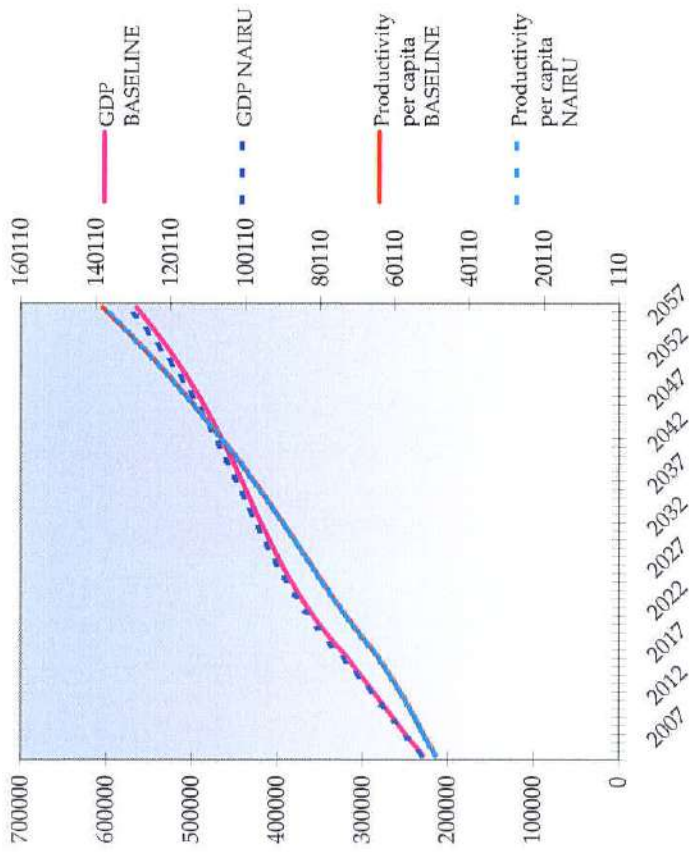


FIGURE 4.12

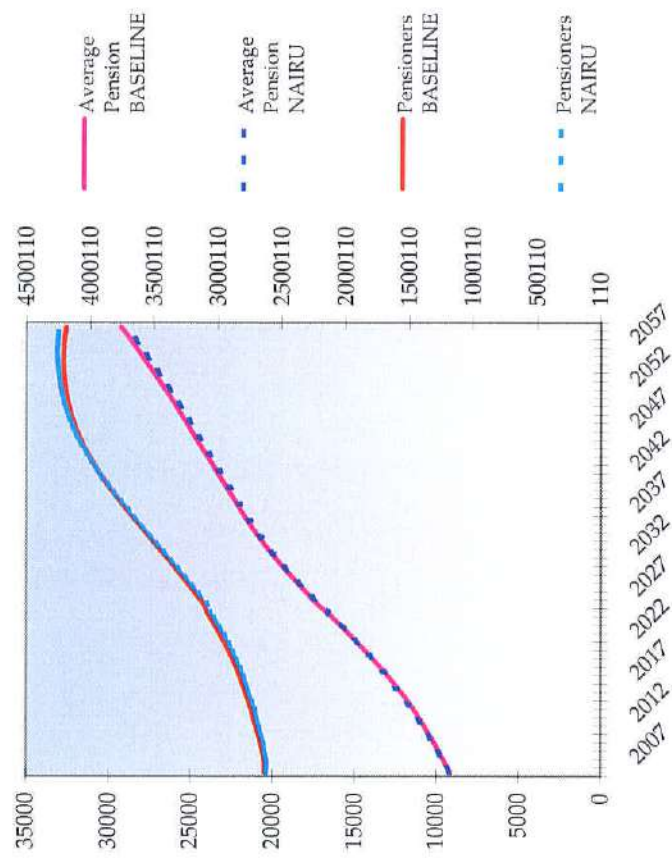


FIGURE 4.13

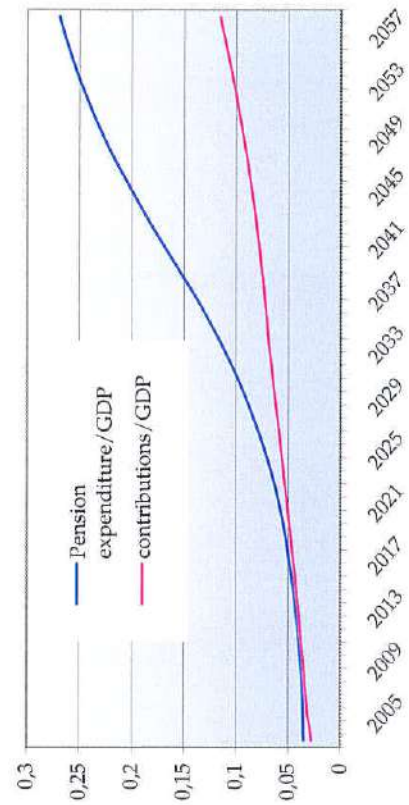


FIGURE 5.1

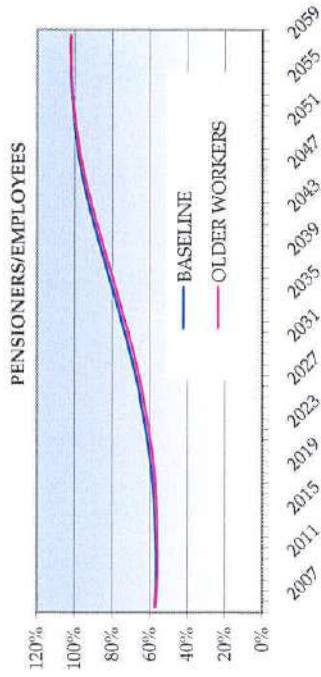


FIGURE 5.2

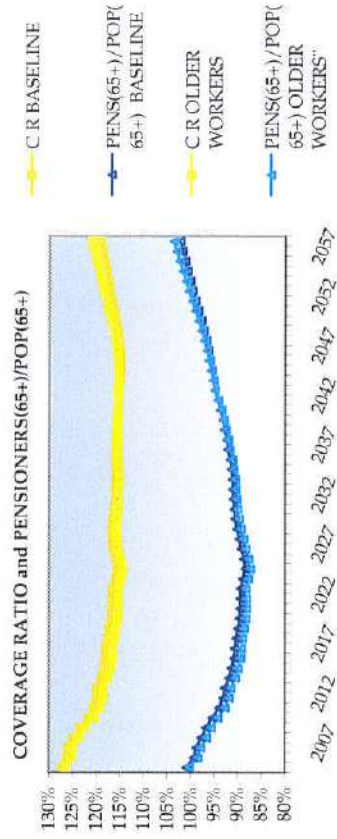


FIGURE 5.3

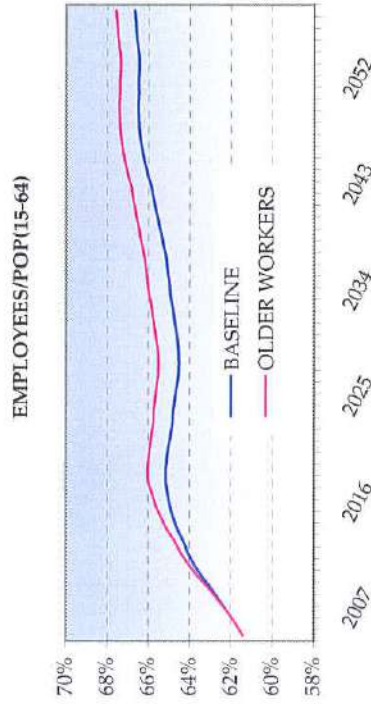


FIGURE 5.4

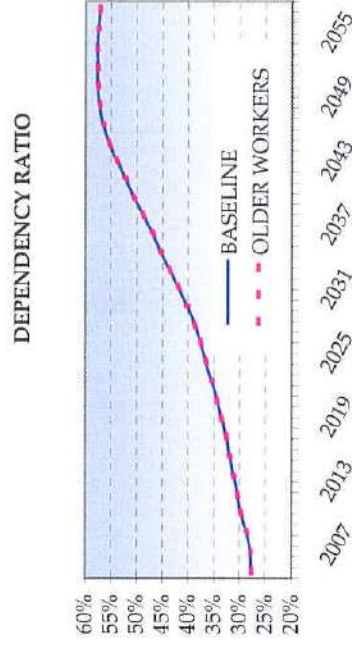


FIGURE 5.4

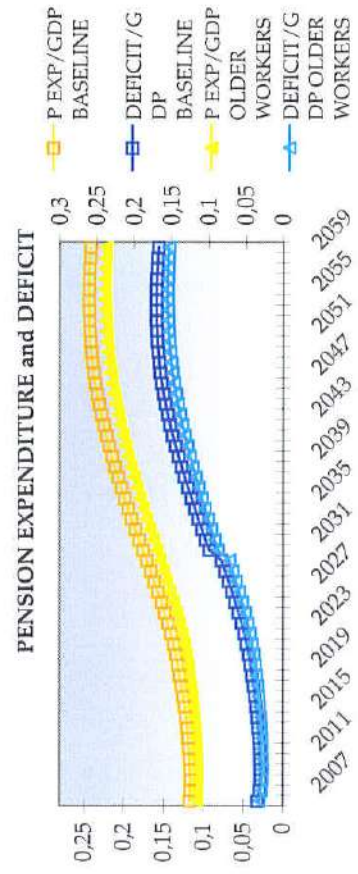


FIGURE 5.6

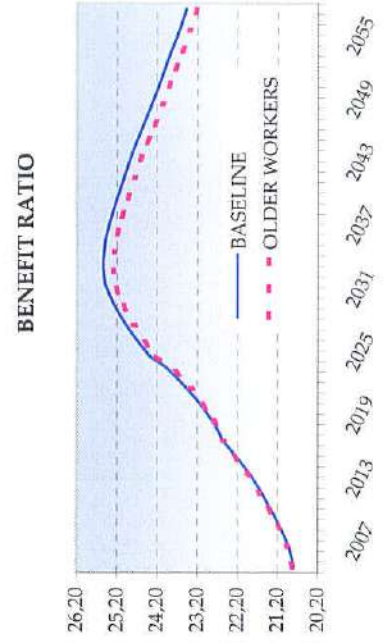


FIGURE 5.7

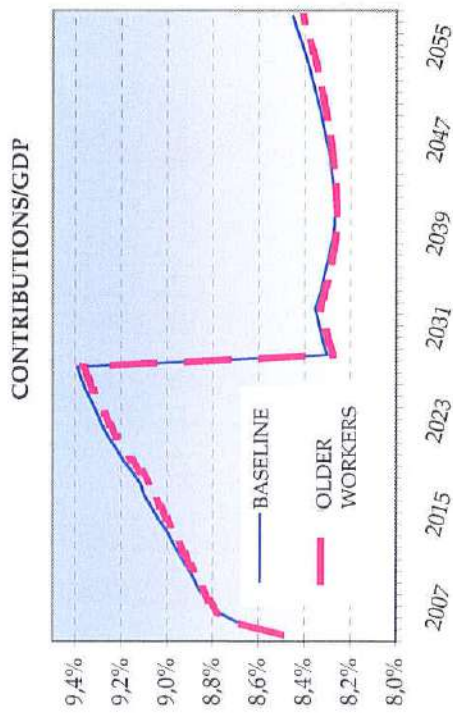


FIGURE 5.8

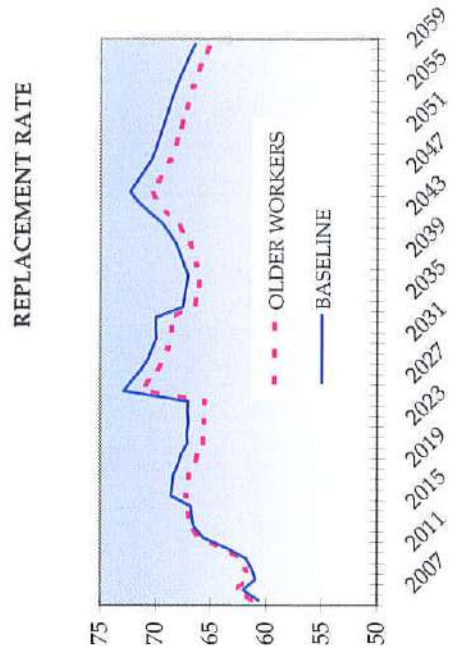


FIGURE 5.9

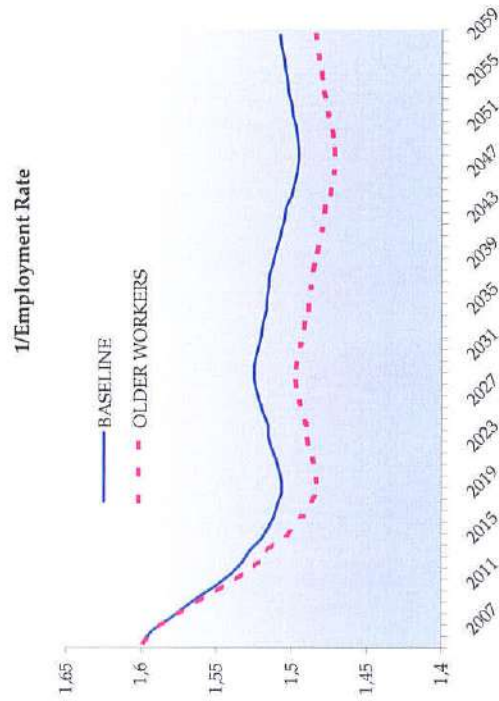


FIGURE 5.10

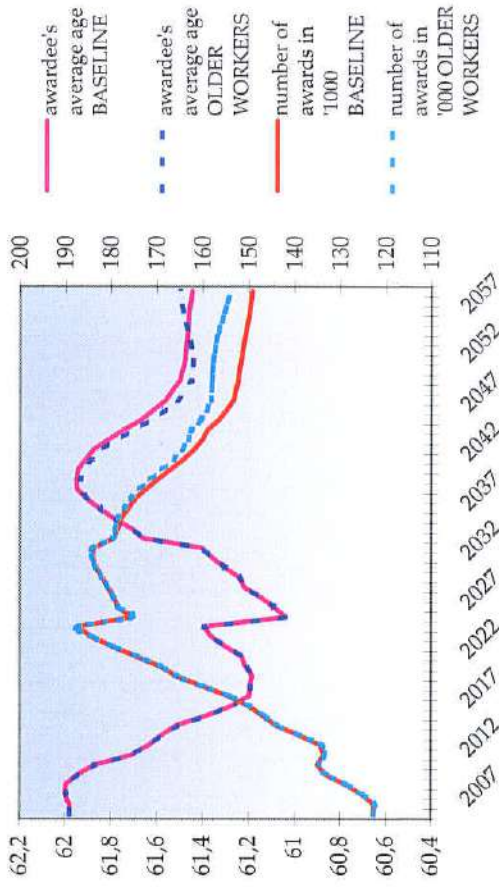


FIGURE 5.11

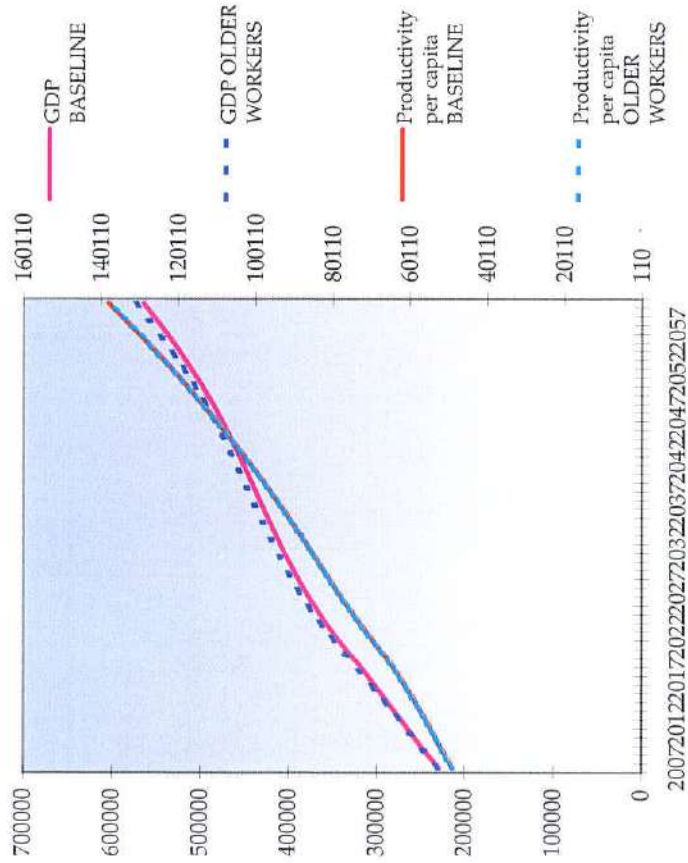


FIGURE 5.12

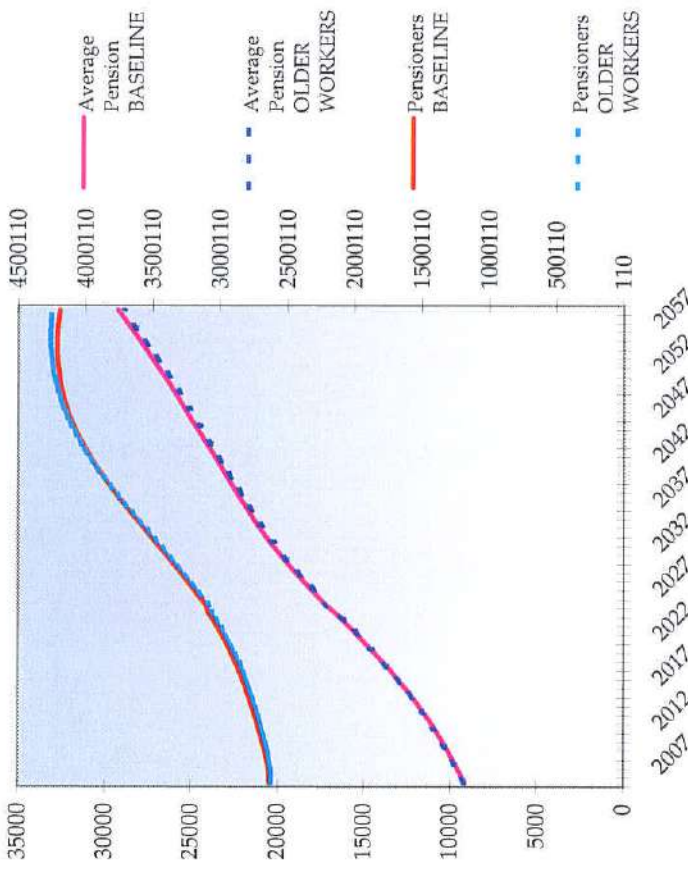


FIGURE 5.13

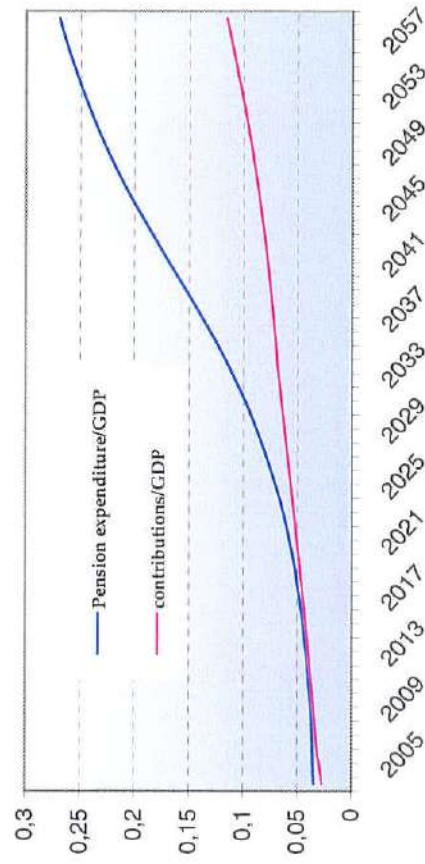


FIGURE 6.1

PENSIONERS/EMPLOYEES

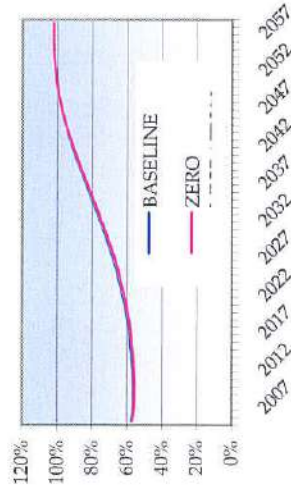


FIGURE 6.3

EMPLOYEES/POP(15-64)

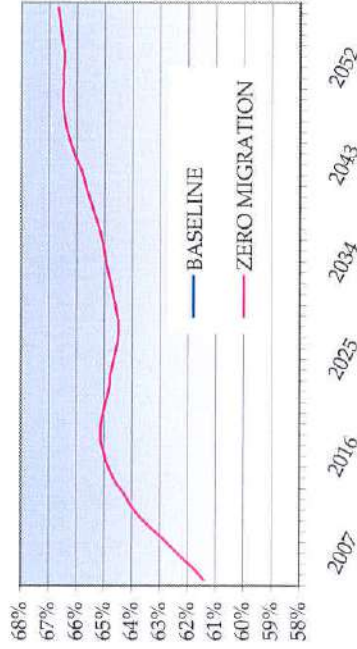


FIGURE 6.5

PENSION EXPENDITURE and DEFICIT

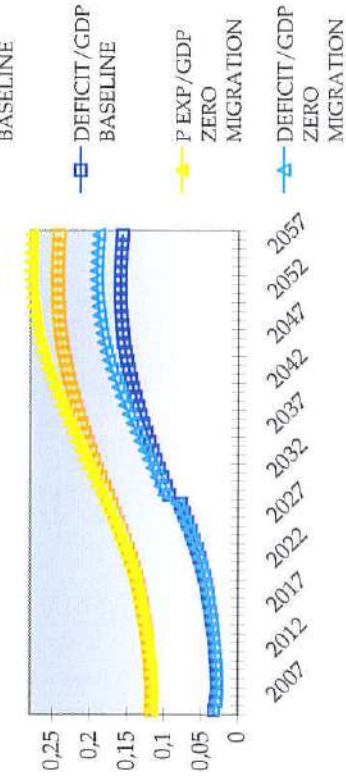


FIGURE 6.7

FIGURE 6.2

COVERAGE RATIO and PENSIONERS(65+)/POP(65+)

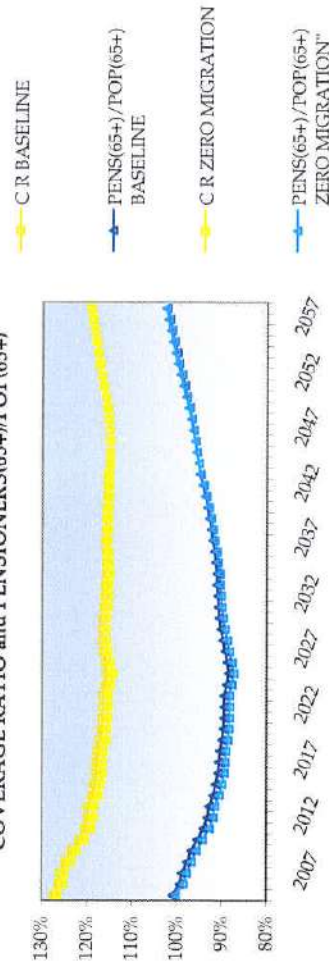


FIGURE 6.4

DEPENDENCY RATIO

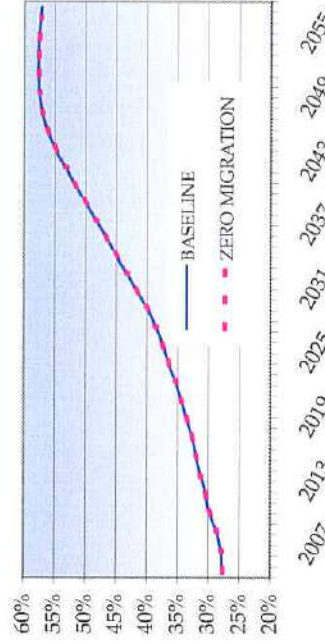


FIGURE 6.6

BENEFIT RATIO

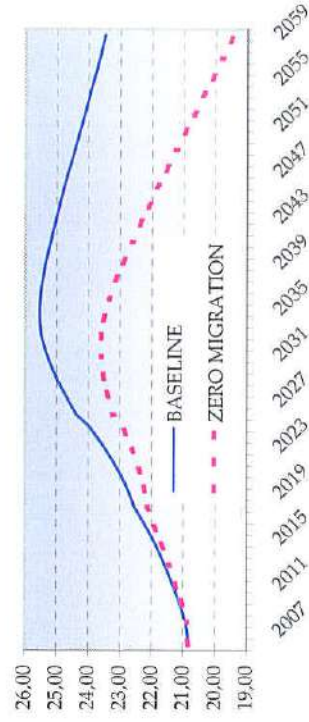
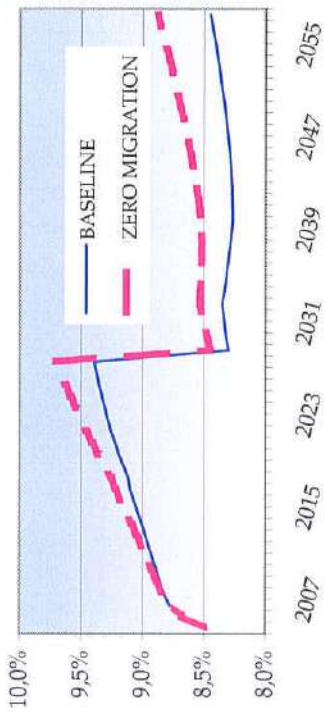


FIGURE 6.8

ZERO MIGRATION

CONTRIBUTIONS/GDP



REPLACEMENT RATE

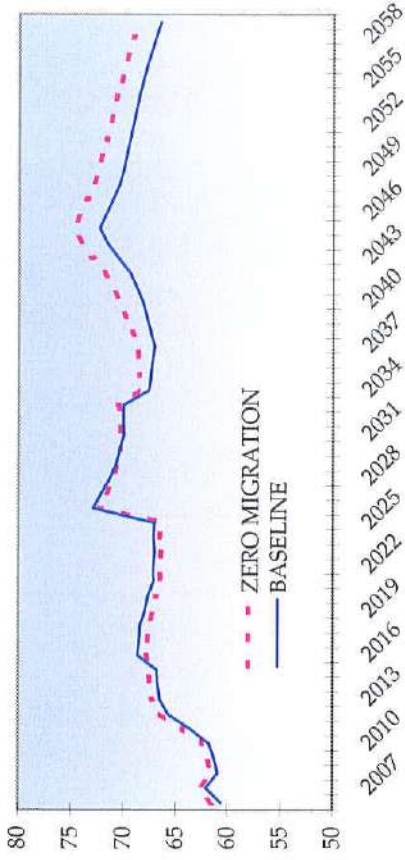


FIGURE 6.9

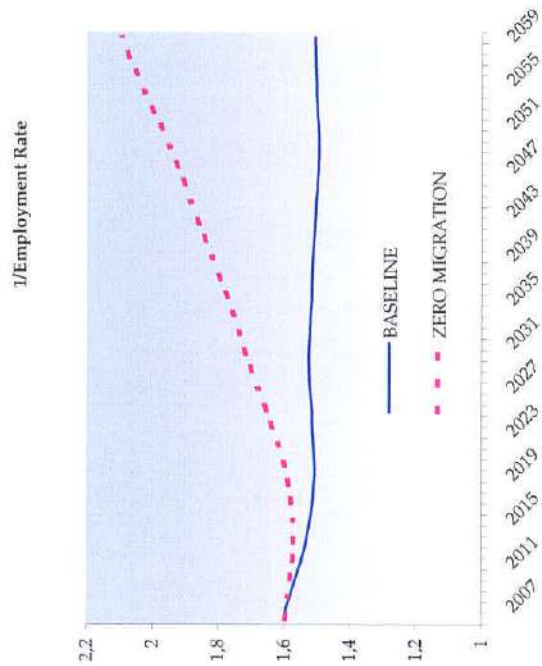


FIGURE 6.10

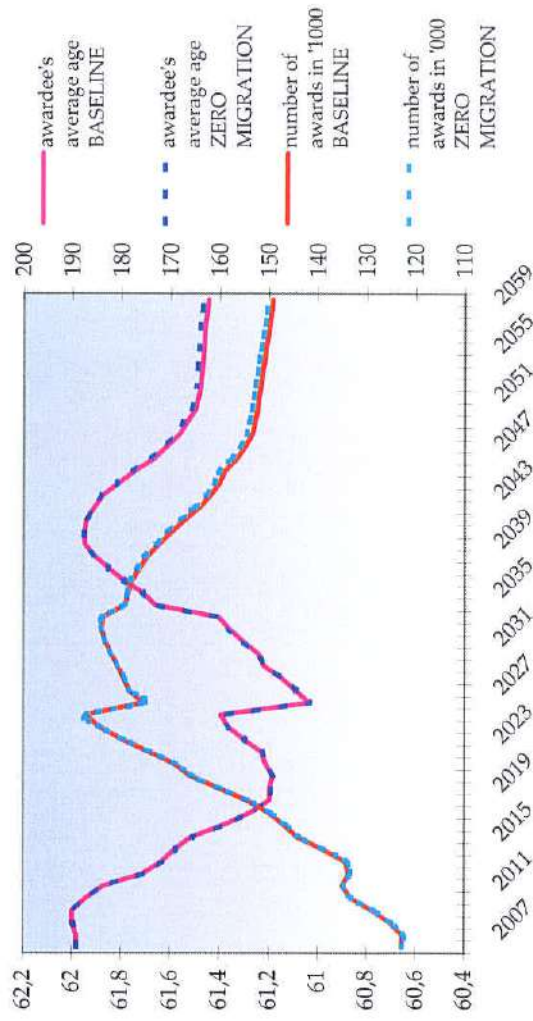


FIGURE 6.11

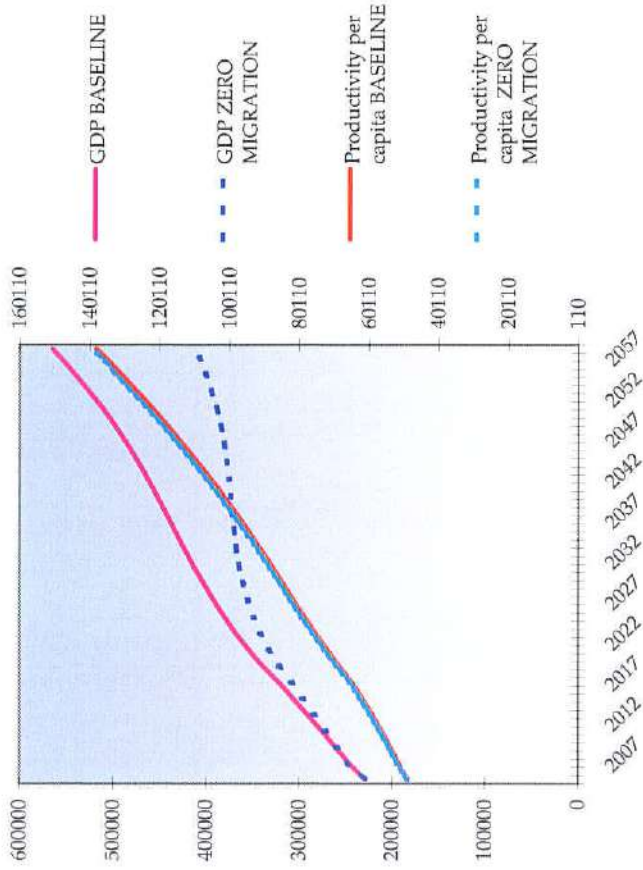


FIGURE 6.12

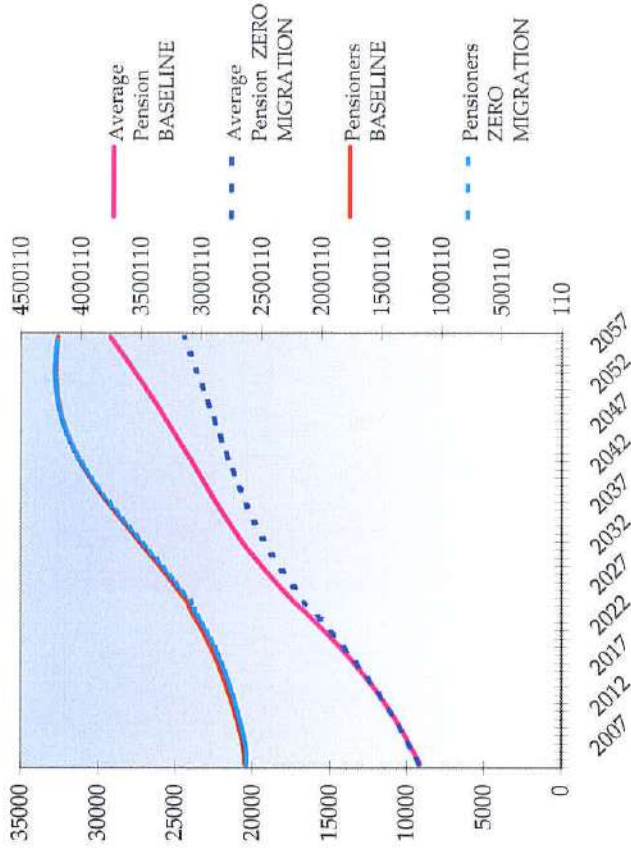
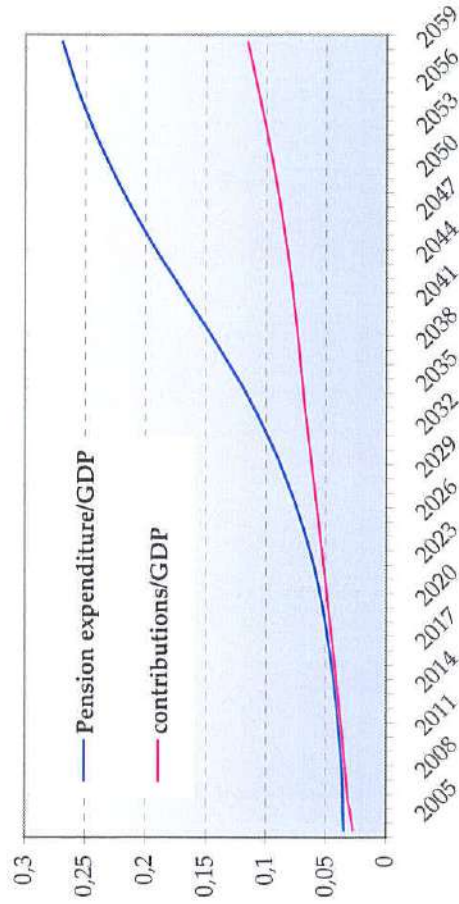
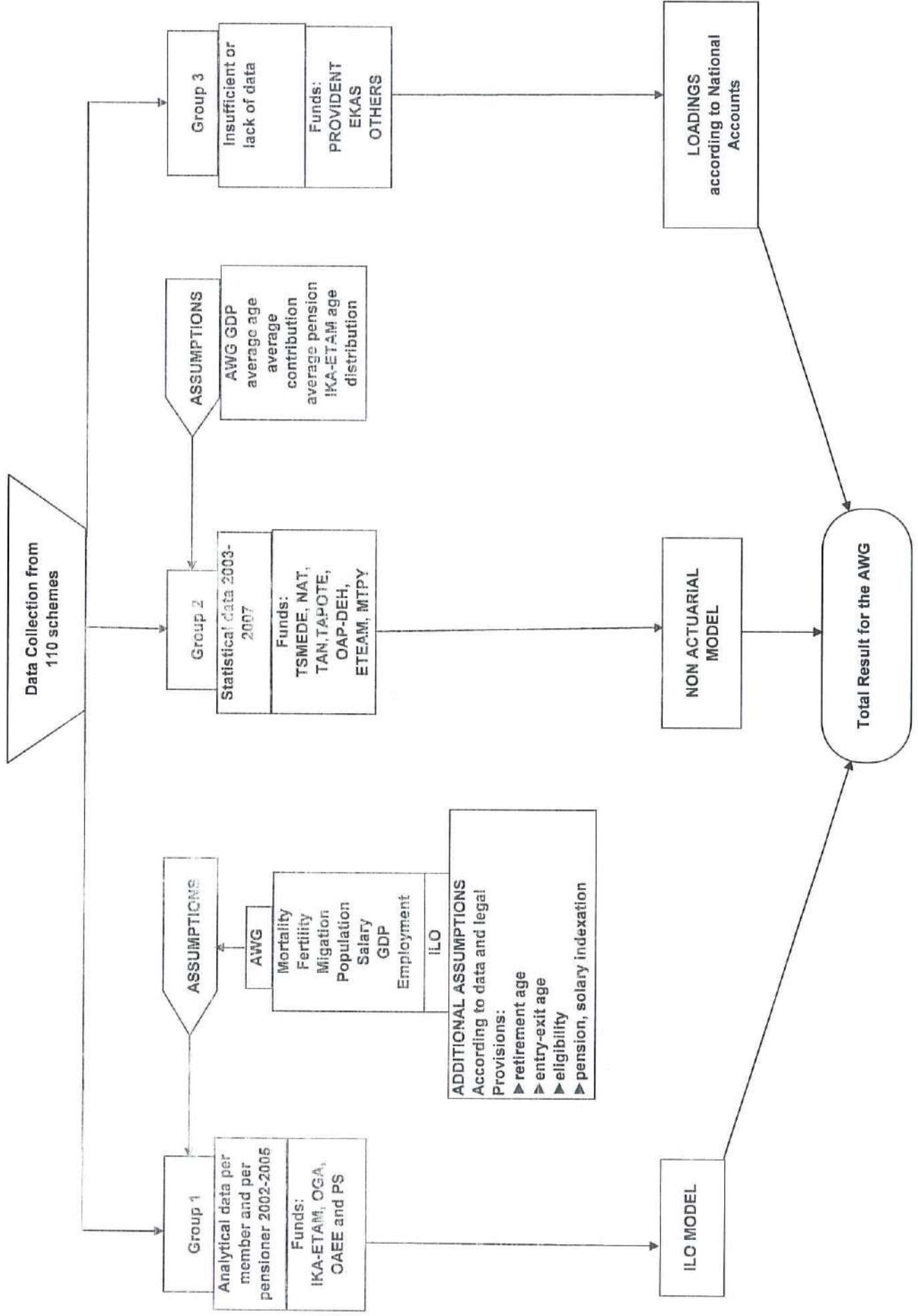


FIGURE 6.13



Part C: Graphical Description of the General Model used for the 2009 study WGA projection

Global Diagram for the Hellenic Model



**Part D: Graphical Description of the ILO Model used for the 2007 study of IKA-ETAM, OGA,
PS and OAEE projection**

Figure: Simulation of the pension scheme (conceptual)

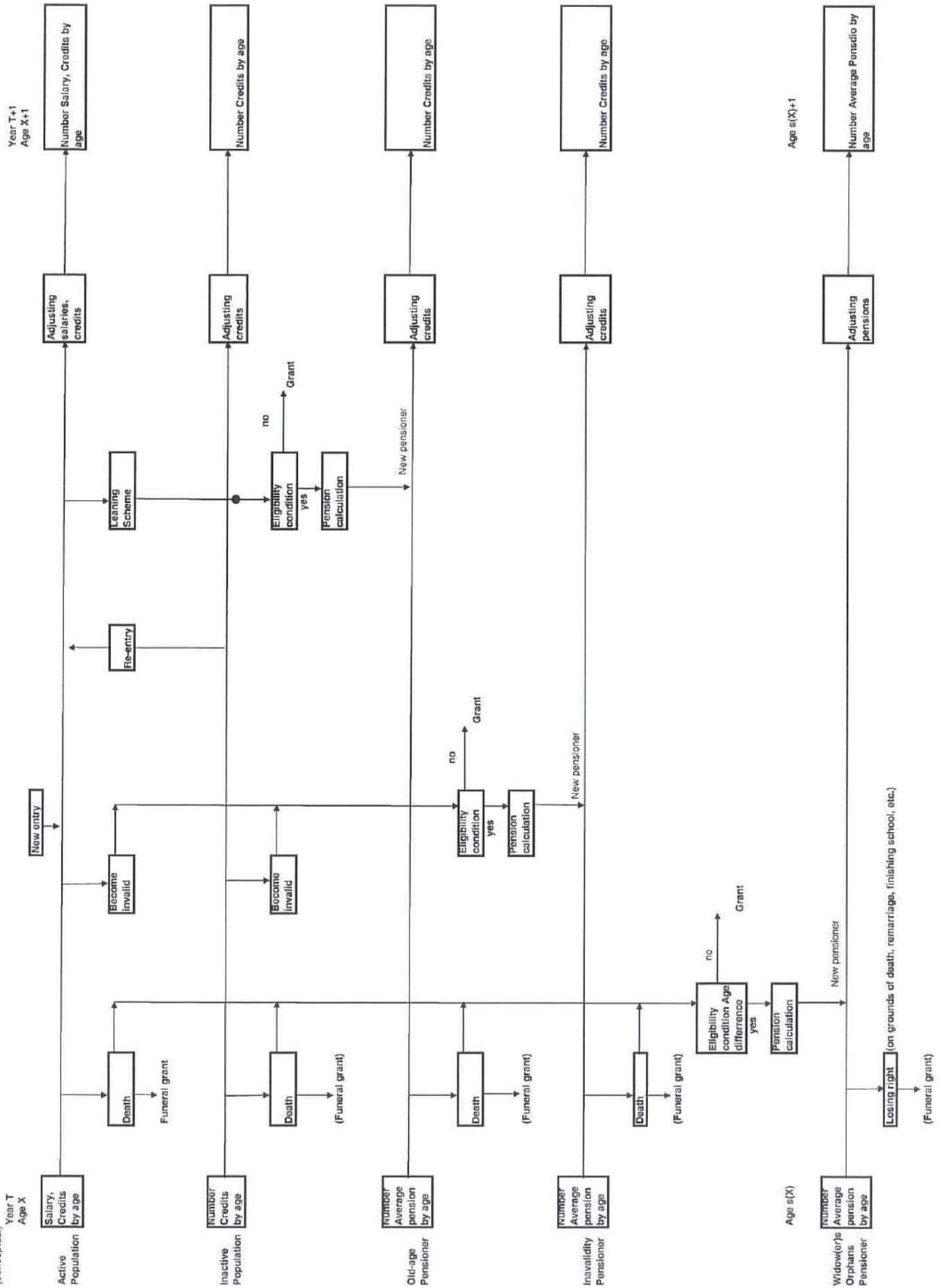


Figure: General file flow of ILO-PENS

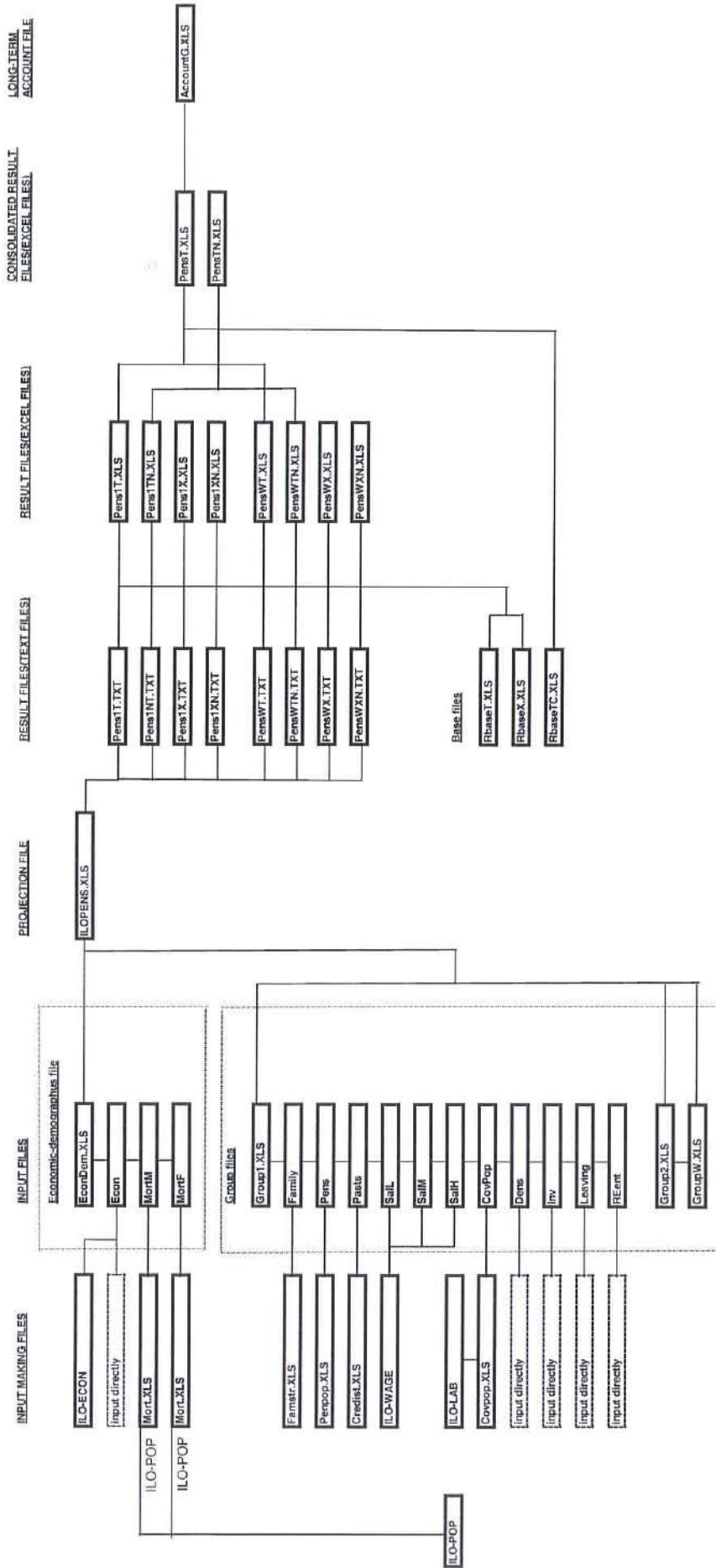
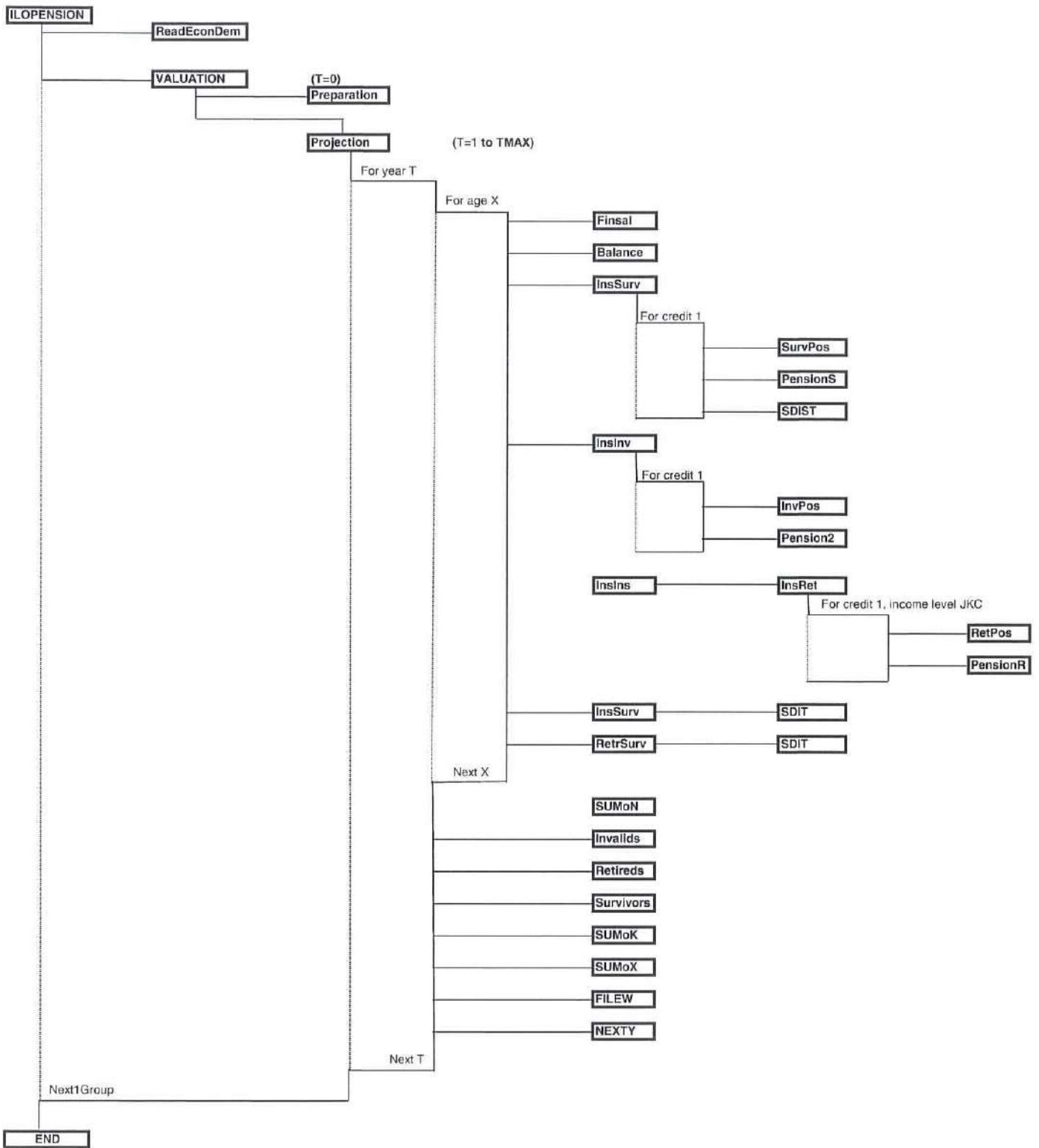


Figure: Contents of the Projection files

Projection files	
ILOPENS.XLS	Worksheets
	Cover
	Input sheet
	Main_1
	Main_2
	Main_3
	Final_Sal
	Pens_Formula
	Eligibility
	Insured
	Old-age
	Disabled
	Wid_Orph
	Summation
	Readfile_1
	Readfile_2
	Writefile
	menu
	Trash
	Contents
	Cover page
	Input sheet
	ILOPENSION
	VALUATION
	Projection
	Final, Balance
	PensionR,PensionI,Pension
	RetPos,InvPos, SurvPos
	InsIns
	InsRet, Retireds
	InsInv, Invalids
	InsSurv, InvSurv, RetSurv, Survivors, SDIST
	SUMoN, SUMoK, SUMoX
	ReadEconDem
	Preparation
	FILEW
	auto_open, CreatFilesXL
	miscellaneous non-used programmes

Figure: Module flow of ILO-PENS



Part E: ILO, October 2008, peer review document



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Votre réf.

The Vice-President
National Actuarial Authority of the
Hellenic Republic
Office of the Chairman
29 Stadiou Str.
GR-10559 Athens
Grèce

**Peer-review of the actuarial projections of the Greek public pension system
undertaken by the NAA**

Dear Vice-President,

We write concerning the technical assistance project between the National Actuarial Authority of Greece (NAA) and the Social Security Department of the International Labour Office (ILO) to support the actuarial valuation of the public pension system in Greece.

The ILO has released a report on "Actuarial projections as of 31 December 2005 of the national pension schemes IKA for private sector workers and OGA for agriculture workers" and will shortly deliver another on actuarial projections for the OAEE and Public Servant schemes. The ILO has moreover delivered to the NAA the actuarial models it developed for the Greek pension system and has trained NAA staff in their use.

Following the release from the EU Ageing Working Group (AWG) of new baseline assumptions for the economic and demographic scenarios, NAA staff, under the leadership of Ms. Marianna Papamichail, performed new projections with the ILO models. These new projections also incorporate the latest legislative amendments adopted by the Greek Parliament relative to the IKA pension scheme. All other assumptions remained unchanged.

At your request, an ILO team consisting of M. Florian Léger (ILO Actuary) and Ms. Viktoriya Glushko (ILO Assistant Actuary) has conducted a Peer-review of the work undertaken by the NAA.

They visited the NAA from 8 to 10 October 2008 with the objective to conduct the Peer-review.

The review started with an analysis of the new baseline assumptions for the economic and demographic scenarios as provided by the AWG in order to identify what changes have occurred in the assumptions themselves as well as in the framework of the scenarios. Notable improvement in the mortality rates provided by the AWG (now up to age 100) is welcomed. Different developments in the population projections, macro-economic assumptions and in the Labour force participation rates were also carefully analyzed.

The results of the projections for each of the four main pension schemes IKA, OGA, OAEE and PS were thereafter reviewed. For each scheme, the impact of the new baseline scenario was analyzed. Detailed comparisons of the demographic and financial results of the new

projections against the earlier projections were undertaken. The number of contributors as well as the number of different categories of pensioners to the different pension schemes and their development over the projection period were analyzed by age and gender. The number of newly awarded pensions were also analyzed by age and gender for all projection years. The development of demographic ratios (i.e. number of pensioners divided by number of contributors) was further analyzed. The development of average salaries and pensions was consecutively scrutinized.

For the pension scheme of IKA, the ILO team checked the changes made by the NAA in the eligibility module of the pension model and further isolated the impact of these new legislative amendments. These amendments consist mainly of stricter conditions for granting early retirement. The impact of amendments which may change the behaviour of participants to a pension scheme is usually very difficult to model. The pension model developed by the ILO allows the incorporation of the new amendments as it consistently models the eligibility conditions of the different categories of IKA participants. Nevertheless, the model is constructed in a way that participants affected by the change will delay their retirement only if they have no alternative solution, i.e. in the present case they will opt for a reduced pension rather than waiting to receive a normal pension. Changing this assumption would require further complicated development of the model.

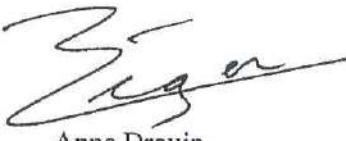
Following this, the ILO actuaries checked the internal modifications in the model. They replicated themselves the calculations performed by the NAA.

They have concluded that the new results were fully consistent with the new baseline assumptions for the economic and demographic scenarios as well as with the latest legislative amendments regarding IKA. They also considered that the models developed by the ILO reacted in a very sound manner, particularly considering the complexity of the Greek pension system.

The Peer-review did not include the projections undertaken for the remaining public pension schemes of Greece nor did it include the auxiliary funds.

Finally, we would like to congratulate the staff of the NAA for the work they have performed both in terms of quality and the amount of time it required. We are very pleased to see that the technical assistance we have provided to the NAA has been very fruitful.

We hope these observations are useful and we remain at your disposal in case you need further clarifications on the above.

PP 

Anne Drouin,
Coordinator,
Governance and
International Financial and Actuarial Service,
Social Security Department,
Social Protection Sector.