The Problems and Prospects Faced by Pay-As-You-Go Pension Systems: A Case Study of Greece

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ABSTRACT/RÉSUMÉ

Without further reforms, pay-as-you-go pension systems throughout most of continental Europe face unsustainable financial imbalances as their population ages. Though this paper describes the Greek pension system, which will face especially severe financial strains, it sheds light on the pension problems of other continental European countries, as these countries' systems share many common features. The main focus of the paper is on the factors of the Greek pay-as-you-go system which result in its future unsustainability. Exacerbating the deteriorating demographics, the system is characterised by very generous pensions relative to contributions for the pre-1993 generation of workers, as well as other incentives/provisions to retire early. To highlight these facets, the study provides simulations of the generosity of different categories of individual pensions under different scenarios as well as projections of aggregate pension expenditures and revenues. It concludes with options for reform.

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S'ils ne font pas l'objet de réformes supplémentaires, les systèmes de retraite par répartition de la plupart des pays d'Europe continentale vont être confrontés à des déséquilibres financiers non viables dus au vieillissement de la population. Ce document décrit le système grec de retraite qui va devoir faire face à des difficultés financières particulièrement importantes. Cependant il expose aussi les problèmes des systèmes de pension des autres pays d'Europe continentale puisque ces régimes ont de nombreuses caractéristiques communes. Le document analyse principalement les éléments du système grec de retraite par répartition qui conduiront à sa non-viabilité future. Outre l'évolution démographique défavorable, le système se caractérise par la générosité des pensions au regard des cotisations pour les travailleurs entrés dans la population active avant 1993, ainsi que par d'autres incitations/dispositifs qui favorisent les départs en retraite anticipée. Pour mettre en évidence ces caractéristiques, l'étude présente des simulations qui font état de la générosité des différentes catégories de pensions individuelles, suivant différents scénarios, ainsi que des projections des dépenses et des recettes du système de pension. Elle se termine par des propositions de réformes.

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Paul Mylonas and Christine de la Maisonneuve[1]

I.   **Introduction**

1.   Critical reforms to the pension system were undertaken in 1990-92 to stem its rapidly deteriorating financial position. It was recognised at the time that these reforms would provide only some temporary breathing space until more fundamental changes to the pay-as-you-go system could be implemented. Indeed, unfavourable demographics -- worse than in most industrial countries -- combined with a still generous, but inequitable system, will soon expose the unsustainability of the situation again. The OECD *Economic Survey of Greece* (1997) included an extensive analysis of the problems plaguing the Greek pension system and presented long-term projections. It pointed to loose eligibility conditions, introduced mostly during the period 1978-85, combined with individual pension benefits which in general far exceed the corresponding contributions -- and foster early retirement and contribution evasion -- as the main shortcomings of the public pension system. Furthermore, the complexity and excessive segmentation of the system, combined with poor administration, were considered to permit abuses of the system. The long-term projections indicated that Greece's pay-as-you-go system's unfunded liabilities are among the highest in OECD countries. The present value of future pension liabilities, net only of employer and employee contributions, was estimated to be of the order of 200 per cent of GDP. The complexity and data problems of the Greek pension system introduce a greater than usual degree of uncertainty around the central projections. Nevertheless, the order of magnitude of the imbalance clearly indicates the need for an overhaul of the pension system so as to better align individual pension benefits with contributions and at the same time provide adequate income security in retirement, especially for the elderly poor.

2.   Following the introduction of a small reform in December 1998, comprising mostly organisational changes, a more fundamental reform is envisaged after 2000. It is generally realised that changes cannot be postponed much longer, because many of them could take several decades to become fully effective and if delayed they will be more onerous to implement. With policy debate approaching a critical juncture, this paper aims to further the analysis presented in the OECD *Survey*. It delves deeper into the underpinnings of many of the results of the long-term projections, as well as presenting a detailed analysis of the individual generosity of the major pension regimes. It also adds an alternative, more intuitive, explanation of the magnitude and sources of the system's imbalances based on simple relations for equilibrium in a pay-as-you-go system. The second section describes the pension system. The third section analyses the microeconomic incentives imbedded in the system. The fourth section attempts to quantify the relative generosity of the different types of pension regimes, including those for early retirement. The fifth presents a brief theoretical explanation of the disequilibrium in the pay-as-you-go system. The final two sections contain, respectively, the projections and review reform options.

II.   The structure of the pension system

3.   Pensions are provided almost exclusively by the public sector, and there is very limited recourse to private pensions.[2] Public pensions are provided through a plethora of funds, which have the status of public entities and form part of the general government sector (Box 1). 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 schemes.[3] The large number of funds arises from the historical development of the pension system, 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 at least one primary fund but usually have supplementary coverage (which may be provided by a separate fund). In addition, some workers contribute towards a lump-sum separation payment at the time of retirement. Thus segmentation of the pension system is both horizontal across economic sectors and vertical among three levels of pension payments: primary, supplementary and separation payments. Annex I provides a description of the problems of accountability and inequity arising from excessive segmentation of the pension system.

Box 1.   The main pension funds

The public pension system is highly segmented and complex, containing over 300 funds, with many different regulations for pension rights. The 28 primary pension funds and the system of public pensions can be classified by employment category into five groups whose funds have broadly similar regulations concerning pension rights, though the differences among the five groups are substantial. These groups cover respectively: *i)* private sector wage earners (principally IKA), of which seamen (NAT) are an important subset; *ii)* farmers (OGA); *iii)* non-agricultural self-employed (principally TEBE),[4] of which another important subset covers professionals, such as doctors, lawyers, and engineers; *iv)* civil servants; and *v)* employees in public enterprises and state-owned banks. The large number of supplementary funds (over 200) were mostly created after the second world war to supplement the low level of primary pensions. Individually, these funds cover much smaller groups of workers than primary funds and are often based on enterprise agreements. Two large supplementary funds were created in the 1980s: one to cover approximately 50 per cent of private sector employees who did not have supplementary coverage, and a second for agricultural workers, who account for about 50 per cent of the self-employed. Consequently, only self-employed small entrepreneurs and traders do not have supplementary coverage.[5] Separation pensions cover a smaller group of workers comprising mostly public employees, lawyers, doctors and since quite recently, a few groups of private sector wage earners. Table 1 presents the major characteristics of the primary, supplementary and separation funds that correspond to each of the five categories of workers.

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2.   There are an estimated 35 000 group policies, providing insurance for employees in large, often multinational, firms. Insurance companies attribute the low demand for private pensions to the generosity of the public pension system.

3.   The social security funds as a whole hold financial and real estate assets equivalent to approximately 9 per cent of GDP. The low level of savings reflects the deficit position of many funds and the placement of past accumulated surpluses in bank deposits which yielded negative real rates of return due to the existence of interest rate controls until 1989.

4.   Under the 1998 reform, a new fund will replace the three large primary funds for the non-agricultural self-employed, with regulations resulting in a gradual convergence of pension benefits to the more generous levels of the dominant fund in the grouping (TEBE).

5.   The 1998 pension reform also unified the 12 supplementary funds for civil servants and the 48 funds for rural lawyers. Moreover, the 7 supplementary funds experiencing financial difficulties were merged with the large supplementary fund for private sector employees (IKA-TEAM).

III.   Microeconomic incentives result in high pensions relative to contributions

4.   The complexity and segmentation of the pension system obscures the factors which are straining its finances. Not surprisingly the common theme to all groups of funds is the generosity of individual pension payments relative to contributions. Nevertheless, pensioners (especially from the private sector) complain about low primary pensions, which equal slightly less than one-half the average wage. This paradox is resolved by the fact that contributions have been quite low in the past and often for short periods. In addition, pensions start at an early age—for employees, usually before the age of 55 in the public sector and near the age of 60 in the private sector (Table 2). Moreover, the existence of supplementary and multiple pensions, as well as dependency allowances, often raise a pensioner's income substantially. Annex II presents a brief description of the historical developments of the pension system which have led to its unsustainability and an outline of the main accomplishments of the 1990-1992 and 1998 reforms.

Private sector wage earners

5.   The relative generosity of old-age pensions in the case of private sector wage earners (mainly insured by IKA) arises from two sources. First, the existence of a relatively high minimum pension in conjunction with a low eligibility requirement creates the incentive to retire after contributing for the minimum 15 years (recently raised from 13.5 years). The minimum pension offers a replacement rate which is equivalent to the one derived from the pension formula corresponding to 25 years of contributions at the median income level (currently about 45 per cent) (Figure 1). [6] This relatively high replacement rate has led to the startling number of new pensioners that retire with less than 20 years' contributions and receive the minimum pension.[7] For new pensioners, the number of retirees receiving the minimum pension rose to near 60 per cent from 1985 onwards, so that 70 per cent of the total stock of pensions is currently at the minimum pension.[8] The perverse incentive to retire at the minimum pension, with far less than the normal 35 years of contributions, lowers the effective contribution rate by far more than the effective replacement rate (see section IV).

6.   The second source of the relative generosity for private sector wage earners arises from the formula for determining an IKA pension. Generosity arises first from the short earning period used as a basis for determining a pension. In fact, the pension base is the shortest among OECD countries for private sector employees. Private employee pensions are based only on earnings over the last five years of employment (increased from the last two years in 1992), which also introduces a bias towards

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6.   The replacement rate formula for IKA is complicated. The replacement rates for the first 10 years of contributions range from 30-70 per cent and are inversely related to the 28 income brackets. For every year of service from the eleventh through twenty-fifth year, the replacement rate is raised by a supplementary 1 per cent. For every year of service above 25 years, the supplement is raised, and ranges from 1.5-2.5 per cent, with the premium applied to the higher brackets. The replacement rate is raised further by the double counting of two months' bonus salary (Christmas, Easter, and holiday). The bonuses are included in the pension base, but also continue to be distributed to pensioners. This double counting is being gradually phased out.

7.   See OECD *Economic Survey for Greece* (1997) for a more detailed description of this phenomenon.

8.   The few years for which private sector employees have actually contributed, especially for individuals retiring in the 1970s, likely reflects the impact of urbanisation and the belated increase in coverage that occurred in Greece, but also contribution evasion abetted by the relatively high minimum pension. Perhaps reflecting the latter, the age distribution for male old-age pensioners has shifted noticeably towards younger age groups during the past two decades, weakening the argument that non-qualification is a root cause for the low contribution period.

under-reporting income in years falling outside this period.[9] Second, replacement rates are high for old-age primary pensions and are inversely related to the pension base, which provides further incentives to under-report income. Specifically, for lower incomes the gross statutory replacement rate for old-age primary pensions is near 90 per cent for 35 years' contributions while for higher incomes it is about 75 per cent (see section IV). In combination with generous supplementary pensions, replacement rates are about 100 per cent, and even higher on an after-tax basis, placing them among the highest, relative to respective earnings, in the OECD.[10] This generosity of the pension formula provides additional incentives for contributing few years to the pension system.

7. The perverse incentives, arising from the generosity of pensions, combined with abuses of the system, likely comprise a large part of the explanation for the large shortfall in contributions relative to their potential (i.e. that implied by earned income). If national accounts data are used to estimate private sector wages, an admittedly rough estimation suggests a 20 to 30 per cent shortfall, which can only partly be explained by earnings such as overtime pay for which no contributions are required. The stylised facts also support this notion. Reportedly, workers and their employers -- especially in smaller firms and in the large construction sector -- under-report working days to reduce the cost associated with social security contributions.[11] In the event, it would be surprising not to find evidence of contribution evasion in a system where income tax evasion is also considered to be high.

The self-employed

Non-agricultural sector

8. Small entrepreneurs and traders also receive generous pensions relative to their contributions. They often choose to place themselves in low income contribution classes -- significantly below the average income of the sector – as they can still receive primary pensions which are broadly equal to pensions corresponding to dependent employment. In comparison with IKA pensioners, they make smaller contributions for more years, retiring closer to age 65.[12] Even subsequent to the raising of the minimum contribution class in 1992 toward the average income, the effective contribution rate relative to the average blue collar wage is only 8 per cent, compared with double that amount by private sector wage earners for their primary pensions (Table 3).[13] Though the effective replacement rate stands at around 55 per cent and the base includes all contributing years—in contrast to the last five years for IKA pensioners—the pension is still far too generous in actuarial terms relative to the low contributions (see section IV). The situation for self-employed professionals is similar, though both pensions (including supplementary and separation

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9. For the supplementary pension, the assessment base is even shorter, as the minimum blue collar wage at the time of retirement is used to determine the level for this pension.

10. Moreover, since the pension formula adjustments exceeded wage growth until 1990, replacement rates rose for unchanged real wages (*i.e.* effectively a negative bracket creep).

11. The desire to maintain health coverage is not a disincentive to contribution evasion, since eligibility for full health benefits is achieved after only 50 days' contributions during the past year.

12. Their eligibility period is slightly longer than for IKA (20 years, which will gradually be increased to 25 years by 2007). Though no data exist on the average contribution period on which TEBE pensions are based, the fact that the average pension exceeds the minimum by 20 per cent compared with 40 per cent for IKA suggests a lower number of pensioners retiring at the minimum eligibility period. Funds have different minimum pensions, with the one for IKA about 25 per cent more generous than that for TEBE.

13. For the few self-employed who entered the work force after end-1992, the effective contribution rates are higher.

pensions) and contributions are higher and their funds are supported by earmarked taxes, which in certain cases exceed the revenues from contributions.[14]

Farmers

9.   Farmers receive the lowest pensions, and receive them from age 65, though about one-quarter qualify earlier for a disability pension. They receive a flat pension, currently equivalent to about 29 per cent of the minimum IKA pension. This fixed amount has lost approximately 70 per cent of its purchasing power since 1986. However, farmers do not make contributions towards their primary pensions, and their pensions are funded by the budget (1.2 per cent of GDP) and earmarked taxes (0.5 per cent of GDP). Their low supplementary pensions were replaced by a new primary pension plan which began to collect contributions in 1998, with the Government providing two-thirds of the contributions. The new fund will provide the opportunity for raising farmers' pensions. However, it provides a high statutory replacement rate (50-70 per cent for a full pension) and easy eligibility conditions during the transition period (initially 5 years and rising to 15, with years of contributions under the old supplementary scheme counting towards eligibility).

Public sector

10.   Civil servants and employees of public enterprises and state-owned banks receive the most generous pensions (Figure 2) and can retire at an earlier age, usually after serving 25 years (and significantly less for women hired before 1983, see Annex II). For civil servants, employee contribution rates for a primary pension have been similar to those in the private sector since 1995 (civil servants did not make contributions towards their primary pension prior to 1993).[15] Contribution rates in public enterprises and state-owned banks are higher than those in the private sector (33 per cent for a primary pension compared with 20 per cent in the private sector). For neither category of employees is contribution evasion a real possibility. Public sector pensions for both civil servants and employees of public enterprises and state-owned banks are generous, in part because they are based on the last monthly salary before retirement. In addition, the replacement rates are high, especially in the case of supplementary funds. The effective replacement rate for the primary plus supplementary pension is estimated to be about 100 per cent for both public enterprise employees and civil servants, with civil servants and employees in some public enterprises receiving two supplementary pensions. Employees in public enterprises and state-owned banks receive the highest pensions due to their high wages, with only doctors' pensions coming close. In addition, civil servants and employees in most public enterprises receive a (tax-free) lump-sum separation payment upon retirement equivalent to one and two years of salary (for 25 years' work), respectively, raising their pensions further.

IV.   A comparison of the relative generosity of the main pension funds

11.   This section attempts to quantify the above-described relative generosity of the pensions received by workers in the different sectors, as well as the incentives to retire early, by comparing the present value of an individual's contributions and receipts under various work and retirement scenarios. The objective is to attribute the source of the system's overall disequilibrium (presented in section VI) to the regulations

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14.   For example, the lawyers' fund receives a percentage from all contracts, the doctors' fund 6.5 per cent of the wholesale price of pharmaceuticals (hence taxing other social security funds), which was reduced to 4.6 per cent in 1998, and engineers a percentage of public works.

15.   The employers' share of contributions is hard to define since the Government does not dedicate budgetary resources for civil servant pensions and it has a legal responsibility for the total primary pension outlay.

applying to the different regimes. To facilitate the presentation, the following assumptions were made for the baseline scenario regarding workers in the 5 sectors:[16]

- All have equivalent salary paths -- indexed to equal 100 at the start of their career salary and growing annually by two per cent in real terms.

- All start to work at age 25 and retire after 35 years at age 60.

- Contributions towards a pension (primary, supplementary, and separation) are made according to the current contribution rates in force in each sector (with the rate of the government for the employer's share of civil servant primary pensions contributions assumed to be equivalent to that in the private sector and the non-agricultural self-employed assumed to contribute according to their full income).

- Primary, supplementary, and lump-sum separation pension payments are determined according to the formulas currently in place for the respective pension funds.

- Pensions are indexed to inflation (not to wages) and remain constant in real terms.

- Annual pension payments are received until the age of 75.

The present value of contributions and pension payments are discounted to the date of retirement (at age 60) at a rate of 2 per cent in the baseline scenario.[17] The choice of the real discount rate, the growth of real wages, and their relative magnitudes are key assumptions which will be discussed further when the modelling of the pension system as a whole is described. For the present, the assumption can be supported on historical developments:

	Real wage growth	Real interest rate
	(In per cent; period average)	
Last 35 years (1961 - 1996)	3.1	2.6
Last 25 years (1971 - 1996)	1.3	1.0
Last 15 years (1981 - 1996)	0.1	2.8

Two quantitative measures of generosity are presented in Table 4: the ratio of the present value of pension receipts to contributions (in total as well as for primary, supplementary and separation pensions individually) and the annual rate of return of the contributions (over the working life). Moreover, the replacement rates can be compared with the contribution rates in each sector in view of the similarly constructed income and age structures. Based on this analysis the following observations can be made:

- The contribution rates and replacement rates differ significantly between sectors, but both are very high in all sectors (except in the case of farmers), with the replacement rate near or above 100 per cent of the final wage.

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16. The five sectors are (i) private sector employees proxied by workers covered by IKA, (ii) private sector non-agricultural self-employed proxied by workers covered by TEBE, (iii) farmers covered by OGA, (iv) civil servants, and (v) employees of public enterprises proxied by employees covered by the pension fund of the public electricity company (DEH).

17. The analysis is undertaken in real terms to avoid the complications arising from the need to adjust the base for the calculation of a pension, as well as the ensuing pension payments, for inflation.

− In each sector, the present value of the pension payments exceeds the present value of contributions by wide margins often exceeding 2:1, resulting in significant positive rates of return on their respective pension schemes. Based on these measures, public servants (especially civil servants) have by far the most generous pension system. They are followed by the non-agricultural self-employed (TEBE) and the private sector employees (with the rate of return on OGA high due to the fact that farmers do not make any contributions for their primary pensions). In reality the regimes are even more generous since the contribution rates were raised to their current high levels only by the 1990-1992 reforms.

− Supplementary pensions are more generous than primary pensions, especially those for civil servants.[18]

− Separation payments are the most generous of all pensions, with the present value of contributions deviating the most from the corresponding contributions. Public sector employees are the main recipients of such lump-sum pensions.

12.   A similar analysis can be applied to the new regime applying to all employees entering the workforce after end-1992 (excluding farmers) as well as the new regime which will gradually be phased in for farmers (columns New System and New OGA respectively in Table 4). Though the new regime for the non-farm population is less generous than any of the existing regimes, the present value of the pension payments continues to exceed the present value of contributions.[19] The new regime for farmers is more than fair in actuarial terms only after the inclusion of the government's two-thirds share of the contributions.

13.   The sensitivity of the analysis to changes in certain key assumptions provides some valuable insights into their relative importance for the design of a pension regime. Table 5 illustrates the increase in each regime's disequilibrium due to the addition of survivors' pensions. These are assumed to extend pension payments -- at the lower rate applying in each regime -- for 10 additional years, which is appropriate to capture the longer life expectancy of women and the fact that women on average are younger than their spouses.[20] Table 6 shows the results of delaying the receipt of a pension for an additional 5 years until the age of 65 (though the working life ends at 60) and maintains the assumption of the existence of survivors' pensions. In this scenario, all existing regimes continue to be very generous, with the present value of pension payments far exceeding the present value of contributions. The exception is the new regime for non-agricultural workers, whose equilibrium falls to near balance. Thus, a judgement on the actuarial fairness of the new regime will depend critically on the extent to which: (a) survivors' pensions are successfully means tested under the new regime, and (b) mothers with under-age children continue to retire at age 55, which would reduce the average retirement age to below 65.

14.   By increasing the discount rate, one can simulate the case where interest rates exceed the growth of real wages (a situation of perpetual capital accumulation). Under this (optimistic) assumption (and while maintaining the assumption of the existence of survivors' pensions) the disequilibrium in the existing regimes remain large -- with the important exception of IKA -- while the new regime for the non-

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18.   It has not been assumed that the Government contributes as employer to the supplementary funds. However, even if the Government's share were assumed to be equal to the employee's share (as occurs in the private sector), these supplementary funds would continue to be the most generous supplementary funds.

19.   This calculation does not include the Government's tripartite 10 percentage point contribution towards these pensions' financing.

20.   No survivors' pensions are introduced in the case of the existing OGA regime since both farmers and their spouses automatically qualify for an old-age pension.

agricultural sector (including the Government's participation) yields a slightly negative rate of return (Table 7). By raising both the discount rate and the real wage equiproportionally (to say 4 per cent in Table 8), one observes the reduction in the generosity of pension formulas which use a longer period of working years to establish the pension base. For example, TEBE uses earnings over the whole working life -- adjusted for inflation -- while the last wage is used in the public service.[21]

15.   The final set of simulations indicates the increase in the relative generosity of the different pension regimes when individuals are able to retire early (*e.g.* after working only 25 years). The first scenario permits a receipt of a pension immediately (*i.e.* at age 50) while the second scenario delays the receipt of a pension until the age of 60 (Tables 9 and 10, respectively). For all pension regimes, an earlier retirement whereby a lower pension is received immediately following retirement results in a huge jump in the generosity of the regime relative to the baseline scenario. Moreover, even if the pension is delayed and received at age 60, the rate of return on contributions remains high and perversely <u>increases</u> for public servants and remains broadly unchanged for the self-employed compared with the baseline case where the working life is 35 years and the retirement age 60. The exceptions are IKA and TEBE, where this rate falls slightly. These results imply that in most regimes, pension regulations provide the incentive to retire early. The more appropriate incentives provided by TEBE may explain why few of its members retire early. For IKA, however, other opportunities exist to retire with a generous pension. First, at age 65 with a minimum pension after 15 years of contributions (or at age 60 with 70 per cent of the minimum pension) or under the regulations pertaining to the classification of "arduous and unhealthy activity" whereby retirement occurs 5 years earlier for somewhat higher contributions.[22] In both cases -- but especially the former one -- the generosity of these categories of pensions are higher than for an ordinary pensioner retiring at age 65 (Table 11). It should be noted that an IKA pension is broadly fair in actuarial terms if an individual retires at the age of 65, having worked (and contributed) 35 years and has no surviving spouse.

V.   A brief theoretical discussion of a pay-as-you-go system

16.   The above discussion treated the existing pension regimes as if they were funded systems (*i.e.* the contributions earned interest until they were distributed as a pension payment). However, the regimes in fact are pay-as-you-go systems with little accumulated savings. This section draws out the implications for the pay-as-you-go system as a whole arising from the above-demonstrated lack of actuarial fairness of the existing individual pension regimes.

17.   The condition necessary for a pay-as-you-go system to be in equilibrium (receipts equal to payments) <u>at any moment in time</u>, is:

$$C/B = d \quad \text{where} \quad \text{C is the effective contribution rate,} \qquad [1]$$

C is the effective contribution rate,
B is the effective replacement rate, and
d is the ratio of primary old-age pensioners to contributors.[23]

Based on this simple equation, several important inferences can be made for the Greek pension system:

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21.   In the next section is reviewed the well-known concept that if the real interest rate equals the growth rate of real wages, and pension payments are indexed to wages rather than prices, then their level does not affect the present value of the pension payments net of liabilities.

22.   The contribution rates applying to "arduous and unhealthy activity" are 5.6 percentage points higher for both primary and supplementary pensions compared with the normal ones.

23.   This ratio exceeds by far the dependency ratio derived from the population over the age of 65, divided by that aged 15-65, due to the large number of individuals that retire early.

- If the full adjustment in the pay-as-you-go system is placed on the replacement rate, equilibrium requires its immediate reduction by about one third. The ratio of old-age primary pensions to contributors currently stands at about 40 per cent, and the effective contribution rate and effective replacement rate are estimated to be 14 per cent and 53 per cent respectively (for primary and supplementary old-age pensions).

- Moreover, the replacement rates would have to fall further over time to maintain equilibrium since this dependency ratio is projected to rise to 60 per cent by 2035, as the demographics deteriorate. By that time the replacement rate would have to fall by an additional one third. The adjustment would have to be greater to the extent that the system matures, and thus raises the effective replacement rate (see section VI below).

18.   What are the implications of these results for the system's actuarial fairness? Under the simplifying assumptions that the interest rate is equal to the rate of growth of wages, a funded system is actuarially fair (present value of pension payments equals the present value of contributions) when:

$$C/B = m/n \quad \text{where:} \quad \text{m is the number of years the pension is received, and} \qquad [2]$$
$$\text{n is the number of years contributions are made.}[24]$$

Based on equations [1] and [2], one can draw the following conclusion:

- Equilibrium in the pay-as-you-go system – under the current demographics -- requires a ratio of (average) effective contribution rates to (average) effective replacement rates which are less generous than those that would provide actuarially fair benefits for any individual in the system. This conclusion arises from the fact that the passivity ratio (m/n) is smaller than the dependency ratio (d); the former could realistically be equal to about one third (10/35) while the latter currently stands at 40 per cent and will subsequently rise.[25]

- The above-described adjustment to the replacement rate necessary to achieve equilibrium in the pay-as-you-go system can be decomposed into two components. First, an adjustment to eliminate the relative generosity of the existing regimes, which are too generous in actuarial terms. Second, an adjustment for the poor state of the demographics. Thus, even if the system was fair in actuarial terms, the demographics would result in a large shortfall in contributions relative to payments.

19.   The intuition behind the first result is as follows: unlike a funded system, a pure pay-as-you-go system accumulates no savings. When the demographics deteriorate, the situation is similar to a funded system where individuals retire early (and the passivity ratio increases); there are insufficient funds to fully provide for the pensions under existing regulations. The second observation raises the question of whether it was a mistake to introduce a pay-as-you-go system in the first place.

20.   What are the relative advantages of the two regimes, supposing that a pension system were being set up from scratch? A funded system can provide more generous pensions than a pay-as-you-go system with identical contributions, if the real interest rate consistently exceeds the rate of growth of the contributions base (*i.e.* the sum of the rate of growth of real wages and the growth of the population):

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24.   This condition assumes that pension payments are indexed to wages. If they were indexed to prices, the contribution rate could be raised or the replacement rate lowered relative to the parameters implicit in this relationship.

25.   Both the passivity and dependency ratio would rise if the ratios included survivors' pensions.

$$r > g + \text{population growth, where:} \quad \begin{matrix} r \text{ is the real interest rate, and} \\ g \text{ is the growth rate of real wages.} \end{matrix} \qquad [3]$$

- In the post-war baby boom, favourable demographics, a still immature system with few pensioners, and the existence of controls on interest rates, made a pay-as-you-go system appear attractive. Now however, the current ageing of the Greek population, the maturing of a generous pension system with many individuals qualifying for pension rights, and high real interest rates favour a funded system. Population projections indicate that the population will decline by an average of 1 per cent per year over the next quarter century.

21. Thus we observe that a fundamental drawback of a pure pay-as-you-go system is the potential for large inter-generational transfers when the population growth declines or turns negative. In many other countries in similar circumstances, the pay-as-you-go systems have accumulated a significant (though usually insufficient) amount of savings in anticipation of the population's ageing – in essence acting as a partially funded system. However in the case of Greece, accumulated savings are very small (9 per cent of GDP). What are the options available under the current circumstances?

- Switching at this time to a pure funded system, whereby contributions are saved and are the only source of making future pension payments (*i.e.* no cost is borne by the Budget) entails finding the resources to finance the present value of the net liabilities of all existing and future pensions. If the regime for the post-1993 entrants is broadly fair in actuarial terms, the present value of the future pension liabilities reflects the generosity of the pre-1993 pension regimes.

- To the extent that the regulations pertaining to the pre-1993 regimes are not adjusted and the full future liabilities are not covered by the Budget, then the entrants into the labour force after end-1992 would have to cover the costs arising from the generosity of the pre-1993 regimes. The regulations pertaining to their pension regime would have to be much less generous and, thus, be much less than actuarially fair. They would in essence be paying for two pensions, their own as well as that of the previous generation. Thus, the longer reforms to the current pension regimes are delayed, the larger will be the cost to future generations, either through higher taxes or lower pensions.

VI. Modelling the pension system and projecting its evolution into the future

22. The above analysis suggests that despite any further positive impact expected from the 1990-92 reforms, pension expenditures are set to increase substantially relative to contributions if no further reform measures are taken. Similar to developments anticipated in the other continental European countries and Japan, expenditure will be propelled mainly by the ageing of the population. In the case of Greece, demographic developments are even less favourable than those elsewhere due to the relative longevity of the population. The elderly dependency ratio (population over 65 divided by the population aged 15-64) is expected to increase from about 25 per cent currently, to 40 per cent in 2030 and to a peak of 55 per cent in 2050 (Figure 3). This development is largely pre-determined by past birth rates and could only be altered by further large immigration flows similar to the ones that occurred at the turn of this decade.[26] However, several factors specific to Greece will add additional strain on the system. The system is still in the process of maturing, with replacement rates expected to increase as future pensioners become

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26. The registration of nearly 400,000 illegal immigrants in 1998 is not envisaged to make a short-term impact on the social security system's financing since most contributions are expected to be made for the minimum period sufficient to qualify for health benefits, and thus to lead to substantial expenditures for the public health system.

eligible for the full benefits of the system, especially those provided by supplementary funds and agricultural workers from their new primary pension fund. Further urbanisation will also put upward pressure, with a larger share of the labour force receiving more generous pensions than their farmer parents.

23.   To the extent possible, the OECD's pension simulation model attempts to capture and quantify these effects as well as the lagged effects of the 1990-92 reforms through to the year 2070. It projects a rise of the expenditure to GDP ratio of 1.2 per cent of GDP every five years with expenditure practically doubling when it would reach 23 per cent of GDP by 2050 (Figure 4). (Annex III provides a detailed description of the projections.) Contributions are projected to increase from 7 per cent of GDP to 9 per cent of GDP. This increase mainly reflects two factors. First, the assumption of employment moving out of the lower income agricultural sector. Second, the longer contribution periods for private sector employees, as incentives to retire early diminish when the minimum pension which is currently linked to prices becomes relatively less generous compared with wages. Thus, the gap between total pension outlays and the current rate of contributions (excluding all government sources of funding) is projected to widen progressively from 4½ per cent of GDP in 1997 to about 14 per cent of GDP in 2050.[27]

24.   While Belgium, France and Portugal face similar dynamics, the projected situation in Greece is clearly worse. An important source of the increasing disequilibrium is the rising number of pensioners receiving supplementary pensions, and an increasing transfer ratio reflecting the diminishing distortions arising from a high minimum pension and higher pensions for the self-employed and farmers (Figure 5, panels A and B). Nevertheless, the dominating factor in the increasing financial imbalance is the ageing of the population. The assumed tightening of easy access to pensions and the large number of unemployed without pension rights reduces pressure on the system significantly and acts to partly offset the effect of an ageing population (Figure 5, panel C).

25.   Another indicator of the magnitude of the future gap on current contribution rates is the present value of net pension outlays during this 75 year period as a percentage of GDP. The model projects these unfunded liabilities to be equivalent to about 195 per cent of 1994 GDP (Table 12). This ratio exceeds by a wide margin similar estimates for all other OECD countries. OECD simulations for other countries found present values of net pension liabilities of 102 per cent of GDP for France, 153 per cent of GDP for Belgium and 109 per cent of GDP for Portugal.[28]

26.   With a view to estimating the burden on the budget, the OECD methodology excludes all revenues except employer and employee contributions. Thus, the attainment of estimates for Greece consistent with other OECD countries requires excluding from the pension system's revenues: earmarked taxes, transfers from the budget, and government contributions. Inclusion of government contributions would raise revenues substantially, albeit by adding general taxation receipts to contribution revenue. Specifically, the participation of the Government as employer would add revenues equivalent to 14 per cent of 1994 GDP, if it is assumed that the employer's share for primary pensions is the same as for the private sector. The Government's one-third share of the contributions for post-1992 entrants into the work force would raise revenue by the equivalent of 53 per cent of 1994 GDP, while the Government's two-thirds share of farmers' contributions would add the equivalent of 18 per cent of 1994 GDP. In total, the present value of net pension outlays would thus be reduced to 110 per cent of 1994 GDP.

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27.   The demographic projections do not include the immigrants which entered Greece in the early 1990s. In the short run, their contributions could reduce the pension system's gross financing needs slightly but in view of the generosity of the pensions system, in the long run, their incorporation would be broadly offset by the corresponding pension payments.

28.   D. Roseveare, D. Fore, W. Leibritz and E. Wurzel (1996), "Ageing populations, pensions systems and government budgets: simulations for 20 OECD countries", OECD *Economics Department Working Papers*, No. 168, Paris.

27.   The long-term projections disaggregated on a sectoral basis permit the following observations regarding some of the key factors influencing the projections (Figure 6):

–   The introduction of the new regime for the post 1992 entrants into the labour force slows slightly the acceleration in expenditures on pensions of private sector employees.

–   The reforms capping supplementary pensions would bring down pension expenditures as a percentage of GDP for the civil servants during 2000-2010 and would decelerate the growth of expenditures in the public enterprises and banks (where contribution rates decline for the post-1992 entrants into the labour market).[29]

–   Farm pensions under the new regime result in a rapid increase in pension expenditures and, subsequently, the projected decline in the sector gradually leads to lower contributions and eventually pensions.

–   The gradual elimination of the double counting of two months wages in the pension calculation for IKA reduces pension expenditures in this sector through the year 2005.

–   The floor on contributions of the self employed results in higher contributions and, with a lag, higher pensions.

–   The surplus currently observed for professionals disappears between 2005 and 2010. [30]

28.   Primary pensions account for 85 per cent of the net future liabilities and supplementary pensions for 14 per cent (Figure 7). Nevertheless, the gap between payments and contributions deteriorates the most rapidly for supplementary pensions, with the initial surplus turning to a comparatively large deficit soon after 2005. Similarly, the surplus observed for separation payments also disappears, but about a decade later.

29.   The projection is particularly sensitive to the assumptions for the real GDP growth rate and the discount rate. The baseline simulation -- to be consistent with the projections made by the OECD in other countries -- assumes productivity growth of 1.5 per cent of GDP and a (perhaps optimistic) discount rate of 5 per cent. A lower productivity growth rate will improve the pension system's situation in present value terms since the concomitant reduction in real wages will affect the more generous pensions proportionally more than contributions. A lower discount rate will obviously increase the present value of the liabilities. For example, if productivity growth is lowered to 1 per cent or the discount rate lowered to 4 per cent, the present value of net pension outlays changes, respectively, to 182 and 261 per cent of GDP. The present value of unfunded liabilities would be even higher if the real interest rate were lowered towards the neo-classical growth model assumption of equivalence with the growth of real output (productivity multiplied by (negative) employment growth) – Solow's golden rule. The baseline scenario also assumes an unchanged participation rate. Raising the participation rate by about 10 percentage points to equal the EU average and distributing the ensuing employment equiproportionally among the various sectors results in a small reduction in the present value of net liabilities to 185 per cent of 1994 GDP (Figure 8).

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29.   These reforms were delayed indefinitely in 1998 (see Annex II).

30.   The generosity of the pension funds of self-employed professionals is underestimated due to the difficulty in separating out receipts from earmarked taxes from earnings-based contributions. For example, in the case of the engineers' fund (TSMEDE), all receipts, including a large amount from earmarked taxes, are considered to be contribution-based.

30.   The baseline results obviously carry a wide range of uncertainty around the central results due to the complicated characteristics of the system, its segmentation, and severe data deficiencies, to mention only the main obstacles. In addition, the 1990-1992 reforms were very extensive and some facets difficult to take into account (see Annex III). Despite these simplifications, the model suggests that the results are relatively robust and the overall baseline result will not change by much if more detailed projections are made. In part, this conclusion is based on the fact that many of the more complicated changes take place in the distant future and are thus heavily discounted. For example, under the extreme example that the system does not suffer from any further maturity, the system's financing needs are only reduced by about 20 per cent of 1994 GDP. On the other hand, an assumption of no progress in constraining pension eligibility would raise the unfunded liabilities by about 20-30 per cent of 1994 GDP (see Annex IV for a list of the main sources of uncertainty).

VII.   Options for reform

31.   The projections indicate that the introduction of additional pension reforms cannot be delayed. The gap between expenditures and contributions will have reached 5½ per cent of GDP by the year 2010 from about 4½ per cent in 1997, primarily due to the transformation of the surplus currently achieved by the supplementary funds into a deficit exceeding 1 per cent of GDP. The financing requirement will be about ½ per cent of GDP greater as reserves are run down, and the concomitant revenue lost. Thus, the fiscal burden will increase by about 1½ per cent of GDP. The relatively constrained deterioration in the deficit until 2010 reflects the low birth rate during the second world war and during the years immediately following, which are now resulting in a slowing in the rate of increase of new pensioners (Figure 9). Nevertheless, in view of the present financial position of the pension system, reforms should be started quickly as their implementation requires long lead times, and early implementation would provide large benefits by avoiding the snowball effect of a ballooning public debt.

32.   With many OECD countries facing similar, though perhaps less pressing, situations two strategies for reform have emerged. Most countries have pursued reforms of their pay-as-you-go system, including France (1993), Spain (1996) and Italy (1992 and 1995), or have introduced multi-tiered pay-as-you-go systems, with a flat public pension and an earnings-based component, such as in the United Kingdom and Sweden. A few others have introduced more radical reforms, whereby all or part of the system was transformed into some form of defined contribution system, which is either fully-funded (Australia, Chile and Singapore) or multi-tiered (pursued in Central European countries).

33.   Concerning reforms to pay-as-you-go systems, most countries have hesitated to raise contribution rates further, because of the adverse affect of higher payroll taxes on employment creation. A similar view is held in Greece as the 1990-92 pension reform raised contribution rates to the point where statutory payroll taxes are among the highest in the OECD for private sector employees. To ensure equilibrium, the effective contribution rate for the system as a whole would have to increase gradually from about 15 per cent in 2000 to the obviously untenable 50 per cent in 2050. If the adjustment was made up front it would not require such a large alignment, but it would nevertheless still be too large to represent a viable option. For example, a one-time and sustained increase in the average effective contribution rate to 1½ times the current rate in 2010 would reduce the present value of net pension liabilities by about one-third, to the equivalent of about 130 per cent of 1994 GDP (Figure 10).

34.   On the other hand, the effective contribution rate for most funds is low as compared with the statutory one, reflecting the incentives for contribution evasion, including through the incentives provided by the high minimum pension in conjunction with the low eligibility requirement. For the system as a whole, the effective contribution rate for a primary pension is about half the average statutory one of about 20 per cent. The effective rate could be brought towards the statutory rate without raising contribution rates by stemming contribution evasion. Most importantly, the gradual replacement of the minimum

pension by a means-tested minimum income for pensioners would eliminate a principal incentive for contribution evasion.

35.   The elimination of this disincentive to contribute should help alleviate a fundamental problem of the system, namely the easy eligibility for a pension. Raising the years worked (and contributed) towards a pension is an extremely effective measure since it provides the double benefit of reducing the number of pensioners, while at the same time increasing the number of contributors. Other measures to raise the effective retirement age from its current level between 55 and 60 years would be to further tighten controls to arrest abuses of the early retirement opportunities, especially work in "arduous and unhealthy activity", and access to invalidity pensions (though admittedly much progress has been made in controlling easy access to invalidity pensions). Extending the contribution period for five additional years prior to the receipt of a pension for all funds, except those of farmers and self-employed professionals who already contribute until age 65, (effective from the year 2000) would reduce contingent liability by about 30 per cent. Such a delay in the retirement age could be achieved by raising the effective retirement age to the current statutory retirement age of 65 years. With life expectancy high and increasing, many countries are considering raising this limit to over 65 years. If the limit is raised to 70, the value of the contingent liabilities declines by about two-thirds to about 70 per cent of 1994 GDP.

36.   Nevertheless, a portion of the gains from raising the effective retirement age would be offset by higher pensions once they are paid, arising from the generosity of the existing pension formulae. Thus, it is inevitable that reforms should strengthen the link between the value of individual pension payments and the supporting contributions by setting the pension base closer to earnings over a whole career. In Greece, the pension base for the private sector of the last 5 years of earnings is the lowest in the OECD area, while the base used in the public sector of the last month's salary (or the minimum wage at the time of retirement for the largest supplementary pension fund) is even more generous. Greece should follow the example of other countries and use wages over a longer, if not the entire, working life to calculate pensions (as is already the case for the self-employed small entrepreneurs and traders who make up a large section of the population). The simulations in section IV indicate that a pension base comprising the full career would reduce the replacement rate in IKA and the public sector by 24 and 27 per cent, respectively, if annual real wage growth averages 2 per cent. Widening the pension base in this manner also reduces inequities between blue and white collar workers arising from the latter's more dynamic salaries, who as a result, benefit more from a back-loaded earnings base. Raising the contribution base to comprise a large share of lifetime income should also discourage contribution evasion. In order to achieve a gradual lengthening of the pension base, Greece should follow the example of other countries and soon start lengthening the pension base annually by increments.

37.   In view of the longer life expectancy, as well as budgetary concerns, many countries have also reduced the rate at which pension benefits accrue in order to provide incentives for workers to delay retirements. They have also extended the period required to accumulate benefit rights for a full pension beyond 35 years (*e.g.* for France the limit is 38 years and for Germany 40 years). The accumulation rates in most OECD countries range from 0.5 per cent to 1.5 per cent per year while in Greece, the accrual rate remains very generous in almost all funds. Including supplementary funds, it ranges from a low of 2.3 per cent per year for workers entering the work force after end-1992 to over 3 per cent per year for public servants, while a full pension is usually obtained after 35 years' contributions. These benefit accumulation rates imply very high rates of return on contributions and the accumulation rate would need to be reduced to about two-thirds, be based over a longer assessment period, and be introduced early on, to bring the pension system towards viability. For example, a one-time reduction in the effective replacement rate in the year 2010 by 50 per cent would reduce the present value of the net pension liabilities by about one-half. Alternatively, to maintain the balance for the system would require a gradual reduction in the aggregate effective replacement rate from 53 per cent in 2000 to below 20 per cent in 2050. If, as was mentioned above, reform was delayed so as to effect only the post-1992 generation of workers, the burden of adjustment that would have to be borne by them would have to be even greater. Similar to the strategy for

lengthening the pension assessment period, the accumulation rate should be gradually reduced for all funds. In addition, the accumulation rate could be made back-loaded, with higher rates of benefit accumulation provided towards the latter part of a career.

38.   The indexation of pensions to price objectives of the government is one of the most potent means of controlling pension expenditure and provides one of the few ways of placing a share of the adjustment burden on current pensioners. Despite the recent large loss in the purchasing power of pensions, this policy, in conjunction with the indexation of minimum pensions and the continued strict application of a means-tested supplement to protect the elderly poor, will probably need to be continued until other, more targeted, reforms to the pension system are introduced. However, for equity reasons the indexation of pensions should be identical across sectors and types of pensions.

39.   In addition to changing the basic parameters of the current system, unification of the regulations would enhance equity and provide considerable economies of scale. The decision to unify the regulations was already accepted for the generation of workers who entered the labour force after end-1992. The concept of a unified system across sexes, sectors and levels of pensions (*e.g.* the supplementary pensions) could help make the need to reduce the generosity of pensions become more palatable. It would eliminate imbalances across sectors and generations, with the most generous benefits adjusting proportionally more. Similarly, the choice to subsidise pensions of women, and especially those with under-age children, and the pensions of the declining agricultural sector should at least be undertaken in a more equitable manner, emphasising means-testing. Such a policy would admittedly require an improved administrative capacity. Survivors' pensions should also be means-tested, as will be the case for those that entered the labour force after end-1992. The 1998 reform took a step in this direction by limiting access to survivors' pensions. A unified fund also would lower costs both through administrative economies of scale and through improved monitoring to reduce abuses such as exceeding the global limit of the system on total pension receipts.

40.   As a first step towards the unification of pension benefits, savings could be made by unifying primary and supplementary funds and their benefits within individual sectors (a first step occurred with the non-farm self-employed in 1998) (see Annex II). Moreover, since practically no fund is viable over the longer term, the proper functioning of a pay-as-you-go system suggests the pooling of all surpluses to cover the needs of deficitary funds. Raising the transparency regarding the financial position of the system in this manner may help reduce the abuses of the system. For similar reasons, earmarked taxes obtained over the years by powerful lobbies to finance their pensions should be transferred to the budget. Irrespective of decisions regarding the composition of the system, the speedy establishment of a register for contributors and pensioners would provide a strong weapon in combating abuses of the system (*e.g.* working during retirement while exceeding prescribed norms on earning).

41.   The debate over the pros and cons of a funded versus a pay-as-you-go system has often obscured the key issues of pension reform for countries, such as Greece, which have pension systems with large implicit liabilities in present value terms. Specifically, a successful reform needs to address the issue of the pensions expected by the current work force, but which will far exceed their contributions on present rules. These "acquired rights" count for most of the total implicit debt, indicating that reforms must change these expectations whatever decision is made on systemic reform.[31]   In this regard, a switch from a pay-as-you-go system to a funded system should form part of a strategy to meet at least part of the pension expectations of current workers, at a reduced cost to the budget.

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31.   If the estimate of the value of the "acquired rights" of the current workforce is based on the present value of the net pension liabilities of the pay-as-you-go system to the year 2025, then they would account for about two-thirds of the total net liabilities. However, this estimate would include the contributions of the future generation of workers.

42.   In the case of Hungary, the generosity of the system was reduced for existing and future workers. At the same time, workers were allowed a choice between a reformed (*i.e.* less generous) pay-as-you-go system and a new multi-tiered system with the first tier proportionally identical to the reformed pay-as-you-go system and a funded second tier. It is expected that younger workers would be willing to voluntarily switch to the multi-tier system since they will earn a higher rate of return on their invested contributions. This would make up to them for the difference between an even less generous accumulation rate for past contributions (in the second tier) relative to the reformed pay-as-you-go system. The difference in the accumulation rates for past contributions between the multi-tier and reformed pay-as-you-go system (for the second tier) are the savings to the budget from this systemic change. However, the transfer of even a share of existing workers' contributions towards a contribution-based system will lead to a loss of revenue for the pay-as-you-go component of the system and thus result in a higher budget deficit over the medium term. For Greece, taking this route would imply a strong commitment to significant additional fiscal consolidation as the debt burden is already very high. It would also imply reducing the generosity of pensions <u>through one very significant reform</u>. Subsequent changes to the rules of the system, especially of the funded component, would lead to a large loss of credibility to the system.

ANNEX I

Problems of accountability and inequity arise from excessive segmentation

43.   The segmentation and complexity of the public pension system, in conjunction with poor administration, has led to a lack of transparency and inadequate monitoring.[32] As a result, pension fraud is difficult to detect and contribution evasion is sizeable. The lack of transparency is highlighted by the fact that most funds compile their accounts with delays amounting to several years, while accounting quality is poor. Few funds other than the large fund for private sector employees (IKA) collect anything more than the most basic data on their pensioners or contributors. This precludes a full compilation of pension system data, and raises the potential for abuses, including contribution evasion.[33] It is characteristic of the poor quality of the data that the total number of contributors across primary funds exceeds total employment—as measured by the labour force survey—by about 20 per cent. Moreover, for the largest fund (IKA), declared earnings for contributions fall far short of the respective total earnings data from the national accounts. As funds monitor pensions rather than pensioners, the total number of pensioners is not known, though the number of primary pensioners exceeds the population aged over 65 years by a wide margin. Without proper accounting and administration (*e.g.* a unique social security number), pensioners may receive more than one primary pension and exceed with impunity the existing overall cap on total pension receipts per individual, or continue to receive a pension while working and earning in excess of statutory limits.[34] In addition, little collaboration exists with the income tax authorities to verify if contributions are consistent with declared income.[35] Frequent recourse to contribution amnesties—four since 1985 -- have further weakened incentives to contribute. In an effort to improve monitoring, the 1990-92 reforms set up a national registry. However, its completion has been delayed until well after the year 2000.

44.   The segmentation generates additional problems. First, it is inevitable that any system where funds are based on economic sectors will eventually include funds covering sectors with a declining

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32.   No one ministry is responsible for overseeing all funds, though the majority are under the supervision of the Ministry of Labour and Social Affairs.

33.   The term "contribution evasion" is used to describe the phenomenon whereby individuals do not declare their working status, as well as the situation where contributions are in arrears.

34.   Legislation does not forbid either the receipt of multiple pensions or working while receiving a pension. The most common cases of multiple pensions are reportedly: *i)* female spouses who receive their own and their husband's survivors' pensions (male workers can only receive a survivor's pension if they are invalids or have young children); *ii)* private sector salaried workers who had a second career as self-employed; and *iii)* public sector employees who had a second career in the private sector. In the second case, a slightly longer contribution period is required to qualify for a second pension. The total value of all pensions per individual was capped at four times the 1991 *per capita* GDP in 1992. Regarding the right to work while simultaneously receiving a pension, a pension is suspended only if the earnings from employment are more than twice the level of the minimum wage. For recipients of the minimum pension, the pension is fully suspended in the event the recipient works. However, these restrictions only apply to private sector employees (IKA). These conditions will change from 2001 (see Annex II).

35.   The 1992 reform required the tax authorities to receive confirmation from a firm's social security fund that the requisite contributions have been paid prior to making any refunds. However, this measure's effectiveness is circumscribed without the fund's ability to verify wages and employment time. More effective was the introduction in the construction sector -- where contribution evasion is reportedly most acute -- of presumptive days of contributions.

number of contributors especially when the system as a whole faces deteriorating demographics.[36] Even if the overall system is sustainable this will lead to financial difficulties unless there exists access to a common pool of resources which is funded by the surpluses of the more dynamic sectors.[37] Though there is no overall effect on the general government deficit as the consolidated system balance remains unchanged, the prospect that liabilities will be absorbed by budget transfers could lead to a moral hazard problem with, for instance, too generous pension benefits being granted to the current generation of pensioners.[38] In Greece, bankrupt funds (and their liabilities) have been absorbed by the largest social security fund (IKA), which has necessitated budgetary transfers. Other sizeable concessions, which certain sectors have been able to extract, are earmarked taxes to support (or in certain cases practically replace) contributions.[39] Finally, the existence of many funds leads to high expenditure on personnel. Pension funds employ some thirty-five thousand individuals (approximately 1 per cent of total employment) at a cost of Dr 70 billion (0.3 per cent of GDP). Personnel outlays relative to overall social security spending are twice the OECD average.

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36. Currently, two funds are suffering large losses due to the decline of their respective sectors; the seaman's fund and the fund for drivers of public vehicles, which have ratios of contributors to pensioners of 1:2 and 1.1:1, respectively. The consolidation of both these funds into other larger funds is an option under consideration.

37. The 1992 reform introduced a small pooling fund (LAFKA). It is funded by freezing the revenues from earmarked taxes received by certain funds at their nominal 1992 level and shifting the excess receipts to this pool. In 1996, LAFKA receipts were budgeted at Dr 25 billion compared to annual budget transfers to loss-making funds of Dr 750 billion.

38. The system also provides incentives for adverse selection. The large variation in pension benefits and eligibility requirements in conjunction with generous conversion provisions provide incentives for individuals to switch pension funds towards those with higher benefit levels relative to contributions. Such transfers of pension rights reportedly occur most often from the less generous funds for the small entrepreneurs and traders to IKA, which has a higher minimum pension and earlier eligibility. The transfer of pension rights to funds which have less onerous eligibility requirements is partly to blame for the severe financial difficulties of the seaman's fund, when lax transfer requirements during the period 1983-87 resulted in the granting of many full pensions after 15 years of contribution.

39. The most flagrant examples are the self-employed professionals such as doctors, lawyers and engineers (see footnote 14) and journalists who receive a percentage of television and radio advertising costs. Part of the problem stems from the lack of a clear legal distinction between a contribution and an earmarked tax, especially for the cases of the self-employed.

ANNEX II

Historical overview of the Greek pension system:

The unsustainability of the pension system

Expenditure: A large increase in pensions and pensioners in the 1970s and 1980s

45.   The microeconomic incentives imbedded in the system, in combination with the introduction of other measures that increased the system's generosity, resulted in a surge in aggregate pension expenditure. It increased from below 6 per cent of GDP in the mid-1970s to over 12 per cent of GDP in 1990 (Figure A1, panel A). These expenditure developments can be separated into two parts. First, an upward shift in the transfer ratio (the average pension divided by earnings *per capita*) at the start of the decade. Second, a sharp and consistent increase in the eligibility ratio (the number of primary pensions divided by the population over the age of 65).

46.   The main policy change that raised the transfer ratio was the establishment of a link between minimum pensions and minimum wages during a period of rapid real wage growth at the lower end of the wage spectrum. A second factor raising the transfer ratio was maturing supplementary funds, which raised individual pension benefits in the latter part of the 1980s.[40] As a result, the transfer ratio rose by nearly 30 percentage points between 1978 and 1990 (Figure A1, panel B).

47.   Nevertheless, a lowering of eligibility requirements was the main factor raising pension expenditure during the late 1970s and all of the 1980s. As a result, the eligibility ratio rose by over 50 per cent; to reach 1 1/3 primary pensions for every member of the population above the age 65 in 1990 (Figure A1, panel C).[41] The current level of 2.2 million primary pensions (comprising old-age, invalidity and survivor benefits) is equivalent to 60 per cent of employment, which is probably one of the highest percentages in the OECD. Policies that raised the eligibility ratio comprised *i)* the sharp increase in the minimum pension described above, *ii)* better opportunities to obtain early retirement for the rising number of unemployed, *iii)* easier access to invalidity pensions, and *iv)* the provision of pensions for those who were falling short of qualifying for a pension (Box 2).

48.   The effect of these policies can be highlighted by developments in IKA. During 1975-90, an increasing share of retirements was made before age 60, with the earlier retirement of men accounting for the rise (Figure A2, panel A).[42] Women (especially those with under-age children) traditionally have had more generous eligibility requirements.[43] At the same time, about one-quarter of new pensioners received

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40.   The transfer ratio was also propelled upwards by low labour productivity growth, which averaged below 1 per cent during the 1980s compared with 3 per cent during the previous decade.

41.   The ratio exceeds 1:1 due to the institutional factors that permit and/or induce individuals to retire before the age of 65, including generous retirement provisions, women's earlier statutory retirement age, lower retirement limits for many public servants, access to invalidity and survivor pensions, and the indeterminate number of multiple pensions.

42.   Individuals can retire up to five years earlier than the limit of 65 years, with a reduction in pension benefits of 6 per cent per year. This regulation also applies to retirement with a minimum pension.

43.   The more generous eligibility regulations for women permit a woman in the private sector to retire at age 55 with 18.3 years' contributions if she has under-age children, and at age 60 with 15 years' contributions if married. The retirement conditions are far more generous in the public sector. In the civil service, married women hired after end-1982 and retiring before end-1997, can retire at age 58 with 17.5 years'

an invalidity pension, though the share has declined since the mid-1980s as pressures to provide pensions to unemployed workers eased (Figure A2, panel B).[44] Finally, about 40 per cent of private sector wage earners were classified as working under "arduous and unhealthy employment conditions", whereby retirement can be moved forward by five years. Spending developments during this period were relatively unaffected by deteriorating demographics. After having increased rapidly during the 1960s and 1970s, the dependency ratio remained fairly stable during the 1980s, which may reflect a low birth rate during the tumultuous period of the late 1910s and early 1920s.

Box 2. Policies that raised pension expenditure during 1978-82

Transfer ratio

The transfer ratio rose sharply in the period 1978-85 when the minimum pension was linked to an increasingly larger share of the minimum blue-collar wage (initially 60 per cent and subsequently 80 per cent), while the minimum blue collar wage was raised by 50 per cent in 1982. Other policies which raised the transfer ratio were: *i)* on an *ad hoc* basis, pensioners were placed in higher pension classes; and *ii)* Christmas, Easter and holiday salary bonuses, amounting to two months' salary, were added to the calculation of the monthly pension base in 1978, thus raising pensions by 16.6 per cent.

Eligibility ratio

Policy facilitated the provision of pensions for non-qualifiers and older age unemployed. The existence of many individuals who did not qualify for a pension reflected the extension of pension coverage to the entire population in 1982. Moreover, workers who migrated from rural to urban areas had difficulty in qualifying for a pension since farmers do not contribute toward a pension and thus had no pension rights to transfer to their new pension fund upon commencing work in urban areas. A broken employment history, primarily affecting women, is an additional factor which hampers qualification for a pension.

The main measures that eased pension eligibility for workers whose contribution period fell short of the minimum qualifying period were: *i)* permitting individuals over the age of 65 to purchase sufficient pension rights to obtain the minimum pension; and *ii)* introducing a special old-age pension for non-contributors (equivalent to a farm pension) for some 35 000 individuals. Similarly, pension rights were granted to many non-contributors, such as immigrants of Greek origin -- arriving in Greece prior to 1984, especially from Eastern Europe -- and members of the national resistance. In neither case were the beneficiaries required to make a payment towards these pension rights. Finally, agricultural pensions were automatically granted to farmers' spouses in 1981, increasing the number of pensions -- albeit of a low individual level -- by about 120 000.

Measures aimed at the unemployed comprised: *i)* the introduction in 1978 of the "35 years" rule, whereby anyone of age 58 with 35 years' contributions could receive a full pension; *ii)* the *ad hoc* expansion of the "arduous and unhealthy employment" category of contributors who are eligible for retirement five years earlier than the normal retirement age, albeit in exchange for somewhat higher contributions; and *iii)* a lax application of eligibility conditions for invalidity pensions.

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contributions or without age limit after 24.5 years' contributions. For women with under-age children, and 17.5 years of contributions, the retirement age falls to 50. Women hired prior to end-1982 have even more generous age limits.

44. Eligibility for an invalidity pension requires only five years' contributions in IKA, while it is ten years for other funds. Perhaps reflecting the lower eligibility standard, IKA has the highest share of invalidity pensions (equalled only by OGA where invalidity pensions are nevertheless low).

Revenues: rising salaries and contribution rates

49.   Though not keeping pace with expenditures, revenues from employers' and employees' contributions rose steadily as a per cent of GDP during the late 1970s and 1980s (Figure A3). During the period 1975-85, the underlying force was the sharp rise in real wages. Contributions as a per cent of GDP showed some further increase subsequently even though the labour share fell between 1985 and 1990, as the share of workers contributing to supplementary pension funds increased, and more than doubled between 1980 and 1990.[45]   The increased coverage of supplementary funds initially provides extra revenues, but will soon lead to additional expenditures because eligibility requirements are low. A similar short-term source of contributions will arise from the introduction of the new primary fund for farm workers in 1997.[46]

The 1990-92 reforms: a stop-gap measure

50.   The 1990-92 reforms were required to stem an explosive situation. Total pension expenditures exceeded contributions by 7½ per cent of GDP in 1990 -- compared with a shortfall of about 3 per cent of GDP in 1975 -- despite a 3½ per cent of GDP increase in contributions during the corresponding period (Figure A4). To cover expenditures, transfers from the budget increased from about ½ per cent of GDP in 1975 to nearly 4 per cent of GDP in 1990. In addition, some of the larger funds became heavily indebted.[47] Following the introduction of the reforms, contributions increased and expenditures fell, each by 1½ per cent of GDP. The former was achieved by a sharp increase in contribution rates which placed Greece among the countries with the highest non-wage labour costs in the OECD.[48]   Regarding expenditure, the most important measure to break their fast upward trend was the de-linking of pensions from wages. Primary pensions in the private sector were indexed to the increase in civil servant pensions, which have been used along with civil servant wages and the exchange rate policy to influence inflation expectations and thus increased in line with stringent government inflation objectives. As a result, during the 1990-95 period, average primary pensions (excluding farmers) on aggregate declined by over 20 per cent in real terms.[49]

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45.   The increase in the effective contribution rate also reflects the increase in coverage following the extension of the pension system to the whole population and the inflow of immigrants.

46.   Upon its creation in 1982, the eligibility criteria for the largest supplementary fund (IKA-TEAM), covering over 50 per cent of private sector wage earners, was set at 1 000 days' contributions (equivalent to 3 1/3 years) and increased by 175 days every year until it reaches 4 500 days in 2001. Thus, the fund already has close to 200 000 pensioners. On 1 January 1997, the eligibility criteria stood at 2 575 days (equivalent to 8.6 years). Similarly, the eligibility condition for the new farmers' primary pension has been set at five years, and will gradually rise to 15 years over 20 years. Moreover, contributions for supplementary pensions, which it replaces, will count towards eligibility. It appears likely that recourse to the reduced eligibility criteria will be large since the majority of agricultural workers are near retirement. This situation reflects the declining importance of this sector since the second world war from approximately 50 per cent of the labour force to 20 per cent currently.

47.   The Government eventually had to assume most of this debt which was issued with a government guarantee. In the early 1990s, the Government assumed debts equivalent to about 7½ per cent of GDP.

48.   See OECD *Economic Survey of Greece* (1996), Paris.

49.   Primary pensions for the self-employed are adjusted on an *ad hoc* basis for inflation and have exceeded the increases permitted by IKA by about 25 per cent since 1990, leaving their pensions broadly unchanged in real terms.

51.   The large loss in purchasing power arising from the de-indexation was not sustainable and 1996 legislation indexed minimum pensions to CPI inflation and provided for a means tested supplement to low income (non-agricultural) pensioners above the age of 65 (EKAS). This supplement is the first occurrence of the application of means testing in the Greek pension system. The supplement is a fixed amount equivalent to 12 per cent of the minimum IKA pension and will be henceforth indexed to inflation.[50] In 1998, access to the mean-tested pension supplement was broadened (see below). In 1999, the supplement was raised by 50 per cent. These later reforms weakened the initial reform's aim to provide necessary benefits without introducing incentives to retire early.

52.   The other measures to reduce pension expenditure varied across funds, but the main ones gradually reduced pension replacement rates and raised eligibility standards, especially in the public sector, and tightened procedures for granting invalidity pensions. (See Box 3 for a detailed description of the reforms.)   The tightening of invalidity eligibility has proven relatively successful, and reduced the incidence of invalidity pensions to below 15 per cent of private sector retirees, from more than 20 per cent in the late 1980s. The reforms reduced many of the inequities in the system, especially those between private and public sector employees, but they created an important new differentiation, as all workers entering the work force from 1993 onwards are subject to less generous, though unified, rules. Entitlements have been moved in the right direction yet, according to OECD estimates, pensions remain too generous even for new workers to bring the system towards viability. The projections presented above indicate that the changes came too late and have been insufficient to restore the viability of the system.

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50.   Eligibility is based on uniform criteria, the most important of which is total pension receipts. Some 380 000 pensioners (about 17 per cent of the total) have already received the supplement and its cost is estimated to be 0.2 per cent of GDP on an annual basis. Nevertheless, the potential for fraud will need to be faced through co-ordination with tax authorities. If eligibility is broadened, the effectiveness of the measure as a targeted social policy will be reduced. Eligibility for the monthly pension supplement requires a pensioner to fulfil all of the following cascading conditions: *i)* a gross pension income (from all pensions) which does not exceed Dr 110 000 per month; *ii)* total annual income from work and pensions which do not exceed Dr 1.4 million; *iii)* total annual taxable income which does not exceed Dr 1.8 million; and *iv)* total family taxable income which does not exceed Dr 2.8 million. The supplement is reduced progressively for pensioners receiving pensions between Dr 100 000 - 110 000.

Box 3.   The 1990-92 reforms

Revenue measures

For private-sector wage earners, contribution rates were raised by 5.8 percentage points to 20 per cent. For civil servants, contributions were introduced and gradually raised to the level of the private sector by 1995. In the broader public sector, contributions were raised from a range of 14 to 25 per cent to 33 per cent by 1995 (for pre-1993 employees). For the self-employed, where contributions are based on a set of voluntarily chosen income classes (which had not been fully adjusted for inflation), the lower classes were eliminated and the earnings base for contributions was gradually raised towards the 1991 *per capita* GDP (adjusted subsequently by the increase in civil servant pensions). Finally, a progressive tax was placed on all pensions (except for farmers and seamen); amounting to 1 per cent for pensions exceeding Dr 100 000 per month, up to 5 per cent for pensions exceeding Dr 500 000.

Expenditure measures

−   Replacement rates: For IKA pensioners, the replacement rate will be gradually reduced by 14.2 per cent during the period 1992-2001 through the elimination of the double counting of the two months' bonus salary. Moreover, their pension base was increased from the last two to the last five years' salary (adjusted by the corresponding increase in civil servants pensions). For all pensioners, an overall limit was placed on the total value of all pensions per individual pensioner equivalent to four times the 1991 *per capita* GDP (adjusted by the corresponding increase in civil servant pensions). For all funds, but applying mostly to the broader public sector and professionals, the replacement rate of new retirees will be capped for primary pensions at 80 per cent and for supplementary pensions at 20 per cent (from 1998) of the applicable salary base. On the same date, separation payments will be capped at Dr 13.5 million.

−   Indexation: Pensions in the private sector were no longer indexed to changes in the blue-collar minimum wage, but adjusted in line with civil servant pensions, which are in turn adjusted according to the government's inflation objective.

−   Eligibility: For the private sector, pension eligibility conditions were raised from 13.5 years to 15 years' contributions for a minimum pension at age 65, and the minimum pension is increased by 1 per cent for each additional year of contributions above 15 years. In addition, the minimum retirement age (the "35 year" rule) will be gradually raised from 58 to 60 by 2002 (for men only).

−   For the public sector, a minimum pensionable age was introduced for those hired after end-1982 (60 for men and 58 for women), which will be gradually raised to those ages applying in the private sector (65 for men and 60 for women) during the period 1998-2007. Moreover, a minimum contribution period of 25 years was also introduced (which mainly affected women who previously could retire after 15 years' service and at age 42). In addition, the employment period in the public sector required to retire without an age limit will be gradually raised from 32 years to 35 years (by 1997 for women and between 1998 and 2004 for men), a back-loaded pension formula was introduced to provide a greater incentive to retire later, and transitional arrangements were set for public employees hired prior to 1982.

−   Eligibility for invalidity pensions was also tightened. The basic measures raised the minimum degree of invalidity required to receive a pension from 33 to 50 per cent and required verifications of past decisions.

New system

The reforms unified the pension rights and obligations for all public and private-sector employees entering the work force after end-1992, and made them less generous than those applying to the current generation of employees.

−   Retirement age: At age 65 for men and women, and at age 55 for women with under-age children.

–   Replacement rate: 80 per cent for a combined primary and supplementary pension (about 10 percentage points less than the current replacement rate for wage earners) and with a linear accumulation rule at a rate of 2.285 per year (compared with the progressive one applied by IKA currently). The assessment base is the average of the last five years' earnings (adjusted for inflation).

–   Contributions: The new system introduces a tripartite system for contributions, with employer and employees' contributions remaining unchanged, but with government providing an additional contribution (10 percentage points or one-third of the total). Also, the cap on contributions for the post-1992 generation was eliminated.

–   Dependency allowances: For those entering the workforce after 1993, the 1990-92 reforms eliminated the spouse dependency allowance and changed the child dependency allowance to 8 per cent, 10 per cent and 12 per cent, respectively for the first, second and third child, from 3 per cent for the spouse and 20 per cent, 15 per cent and 10 per cent, respectively for the first, second and third child.

–   Multiple pensions: Contributions for a second pension are made on a voluntary basis by the employee for the full (employee and employer) amount, and eligibility for a survivor pension is subject to means testing unless the survivor is disabled.

–   Right to work and simultaneously receive a pension: Pensions will be reduced by one-third if recipients continue to work. Recipients of minimum pensions will have their pension fully suspended.

53.   The 1990-92 reforms have succeeded in temporarily stabilising the finances of the pension system. Though a detailed decomposition of pension expenditure and revenues for 1998 is not yet available, the shortfall between total (public and private) outlays and contributions is estimated to be between 5-6 per cent of GDP. It is, nevertheless, often believed that the pension system is in surplus following the implementation of the reforms, as the pension funds' cash balances are in surplus equivalent to about 2 per cent of GDP. This perception overlooks the transfers from the budget to deficit funds (2½ per cent of GDP), that civil service and other government pension outlays—net of employee contributions—amounted to 2 per cent of GDP, and that funds received earmarked taxes of over 1 per cent of GDP. Moreover, a large part of the cash surplus arose from the increased return on fund assets following the liberalisation of interest rates in 1989.

The 1998 reform: a small reform of the social security system

54.   In March 1998, the Government promised to introduce a two-stage pension reform. The first stage would introduce minor organisational changes during 1998 and reflects agreement between social partners in the social dialogue on pension reform. The second stage will aim at a major overhaul of the public pay-as-you-go pension system. The timing of the implementation of the second stage has not yet been announced but is expected to coincide with the next legislature which will convene no later than October 2000. Delaying the introduction of significant changes to the pension system was partly due to the Government's desire to focus on labour market reform. The Government also did not implement cost saving measures that had been planned by the 1990-92 pension reforms to start in 1998. These delays in the implementation of pension reform will make the eventual overhaul of the system more difficult.

55.   The first stage of pension reform aims to improve the organisation of the pension system by reducing the large number of funds, which results in a complex and non-transparent structure. By reducing their number, the reform also aims to eliminate certain deficitary funds through mergers with larger, financially healthier ones. A new fund has replaced the three large primary funds for the self-employed, unified 12 supplementary funds for civil servants and the 48 funds for rural lawyers, and merged 7 supplementary funds experiencing financial difficulties with the large supplementary fund for private-sector employees. The creation in the near future of a unified pension fund for employees of state-owned banks is also envisaged. These operations will increase overall pension expenditure since no

individual's pension will be reduced while in several cases the regulations will allow a gradual convergence of pension benefits to the more generous level of the dominant fund in the new groupings. The most notably examples are the cases of the new fund for the self-employed and the supplementary funds.[51]

56.   The reform also aims at generating some financial savings for the social security system. First, efforts will be made to reduce contribution evasion, including through the introduction of labour inspectors. Second, starting in 2001 pensioners who work and are below the age of 55 will not receive their pension. Those who are above the age of 55 will receive only 30 per cent of their pension for the amount of pension exceeding Dr 200 000 per month (which effectively excludes over 80 per cent of all private sector pensioners). Third, in response to a constitutional court ruling on the equality between the sexes, survivors' pensions will henceforth also be provided to both sexes — males had previously not been eligible. However, the survivors pension will be provided for only three years. Exceptions exist if a survivor is without work or pension (in which case after the third year the survivor would receive 50 per cent of the survivor's pension if above the age of 65 and nothing if below the age of 65). This measure will not be applied retroactively to women but men can apply for a survivor's pension if they qualify.

57.   The Government did not implement certain planned aspects of pension reform, and also took decisions that are not commensurate with the final reform objectives. Most importantly, the Government has decided to postpone indefinitely several measures foreseen by the 1990-92 reforms of the pension system to commence in January 1998. Specifically, legislation envisaged the following measures. First, the restriction of all supplementary pensions to at most 20 per cent of the pension base. Second, the raising of the minimum retirement age for receiving a pension early on account of work in arduous and unhealthy environments. Third, the raising of the number of years of work required for eligibility for a full pension in public enterprises and state-owned banks. A less costly measure, but one that constituted an important change in philosophy, concerned the broadened access of low income pensioners to the means-tested pension supplement. This supplement was introduced in 1997 for pensioners above the age of 65 and was a first step at providing benefits in the social security system that did not include incentives for early retirement. The supplement will henceforth be made available to pensioners over the age of 60, and also apply to certain categories without age limit (*e.g.* survivors with under-age children). The supplement was increased by about 50 per cent in 1999 raising the budget cost to Dr 60 billion. In a similar move, the Government did not implement an envisaged reform of the expensive "lifetime" pension for mothers in families with more than two children, which would have made it means-tested and provided only to women above the age of 65.[52] Finally, the Government raised significantly the base used for calculating invalidity pensions for individuals who entered the work force after 1993 (the date of the last major reform). This had previously been based on a share of 1992 *per capita* income (adjusted by the cost of living adjustments applied to private sector pensions). Though several of these measures provided necessary support to low-income pensioners, they may be providing poor incentives regarding early retirement as they are introduced outside a comprehensive reform package.

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51.   The package of measures also includes raising the limit on the share of liquid assets that pension funds can invest in the stock market from 20 per cent to 23 per cent beginning in 2001; the remainder will remain invested in government bonds.

52.   There are 210,000 women eligible for this benefit with a budgetary cost of Dr 130 billion.

58.　　　The overall deficit of the social security system will be contained by the additional contributions from the new primary pension for farmers and the registration of illegal immigrants. The effect on overall government finances will be much smaller, however, since the Government pays two-thirds of the farmers' contributions. Moreover, eligibility requirements for such pensions are lax, and many immigrants are likely to contribute for the minimum period necessary to attain eligibility for health coverage and will receive health care throughout the year. Transfers from the budget to social security funds are expected to increase from Dr 840 billion in 1997 to an estimated Dr 900 billion in 1999 (equivalent to 2½ per cent of GDP).

ANNEX III

Pension projections: a description of the model

This annex describes the construction of the pension model, whose basic design is based on Van Den Noord and Herd (1993).[53]

Coverage

The model covers old-age, survivor and invalidity pensions, provided by primary and supplementary funds, as well as separation payments. Health care and other social benefits (and their corresponding contributions) are not included in the calculations. The model divides contributors and pensioners into the following seven groups:

- private sector dependent workers (IKA, IKA-TEAM, etc.);

- seamen (NAT);

- self-employed small entrepreneurs and traders (TEBE, TAE, etc.);

- self-employed professionals (doctors, lawyers, and engineers);

- farmers (OGA);

- general government employees (excluding war pensions and pensions for members of the national resistance); and

- public sector employees in public enterprises and state-owned banks.

Separate estimates are made for each of the above mentioned pension categories for each of the seven groups.

The revenues of the pension model exclude all receipts that are not contribution based such as earmarked taxes (where it was possible to separate out earmarked taxes from contributions), budget transfers to pension funds and earnings from funds' assets. In addition, in order to make the projections comparable to those undertaken by the OECD for other countries, the model excludes contributions that are made implicitly or explicitly by the State. The rationale for their exclusion is that the source of such revenues is general taxation. These receipts include the State's one-third share of the tripartite financing for the contributions of workers that entered the workforce after 1992, the State's two-thirds share of the contributions for farmers' pensions, and the State's implicit contributions as employer.

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53. P. Van Den Noord and R. Herd, (1993), "Pension liabilities in the seven major economies," OECD *Economics Department Working Papers*, No. 142, Paris.

Assumptions

Demographics and employment growth: The population projections for the period 2000 to 2070 are taken from the World Bank.[54] The main assumption underlying the projections are that fertility rates will return to replacement rates by 2030 and that life expectancy will increase by about 4 years during the same time horizon. The labour force participation rate is assumed to be constant. The NAWRU is also assumed to be constant from 2000 onwards, implying that the unemployment rate thereafter remains at about 9 per cent.[55] The initial distribution of employment between the different sectors is based on the labour force survey of the Greek National Statistical Agency and national accounts data. The employment shares do not remain constant over the projection period for all sectors. The projections assume that the share of employment in the agricultural sector falls to 14 per cent by 2035 from 21 per cent in 1995. The employment share of the self-employed traders and small entrepreneurs and private dependent workers is each assumed to increase by one-half of this decline. For the other sectors, the employment share is assumed to remain constant throughout the projection period.

Earnings and output growth: The analysis is conducted in constant 1994 prices. Earnings are assumed to increase in line with labour productivity (1½ per cent per year for each sector). Output increases in line with productivity and employment.

The model

Pensioners and contributors: The base year of the model is 1994 -- the most recent year for which accounts could be collected for the main pension funds. Old-age primary pensions (the number of pensioners is not known) are assumed to grow in line with the population over the age of 60 or 65, depending on the sector, as well as movements in the sectoral employment rates (lagged by the average number of working years in the sector). The unemployed are assumed to be ineligible for any pension. Moreover, pension eligibility is assumed to tighten under the 1990-92 reform. For the sectors where there is a discrepancy between the number of primary and supplementary pensions (primarily IKA), supplementary pensions are assumed to mature and equal the number of primary pensions. Survivors pensions are assumed to grow in line with the population aged 50 and above, and invalidity pensions in line with the population between the ages of 45 and 60 years old. Separation payments are assumed to grow in line with the population aged 60-65 years. Contributors are assumed equal to the number of employed workers.

Contributions: For each fund (primary, supplementary or separation), contributions are the product of the sector specific contribution rate, the wage and the number of contributors. For each fund, the contribution rate is derived from 1994 data, using the above-described hypotheses for the number of contributors and the sectoral wage. Adjustments are made to the contribution rate to account for the 1990-92 reforms. These include the following. First, the increase in the contribution rates of government employees to those of the private sector, the unification of contribution rates for the post-1992 entrants into the labour force. Second, the increase in the presumed income categories of the self-employed traders and small entrepreneurs.   Third, some increase in the contribution rates of IKA reflecting the reduction in contribution evasion as the minimum wage is kept constant in real terms (and thus provides a declining replacement rate relative to the pension arising from the pension formula). Fourth, the contribution rate for farmers rises, reflecting the introduction of their new primary pension fund.

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54.   E. Bos *et al.* (1994), *World Population Projections, 1994-95*, The International Bank for Reconstruction and Development, The World Bank, Washington DC.

55.   In view of the generosity of the individual pension, a higher labour force participation ratio and a lower unemployment rate would lead to a deterioration of the pension system's financial position, though the increased contributions would improve the system's finances in the short term.

Pension expenditure: The pension outlay per individual is the product of the replacement ratio and the wage at the time of retirement. Since pensions are assumed to be indexed to inflation and not to wages, the pensions of older pensioners are lower than those of younger ones. Thus, total pension expenditure for each fund is the sum of outlays on three or four age groups of pensioners (depending if the retirement age for the sector is 60 or 65); those that have retired during the past five years, those that have retired between 5 and 10 years earlier, those that have retired between 10 and 15 years earlier, and those that have retired more than 15 years ago. The replacement ratio is derived from 1994 data by adjusting the average pension by wage and pension adjustments for the period 1975-94. The replacement rate is adjusted to account for the effects of the 1990-92 reforms. These include the following. First, the lower replacement rates for the post-1992 entrants into the work force. Second, the gradual elimination of the double counting of the bonus months' salary for IKA pensioners. Third, the reduction in supplementary pension replacement rates to 20 per cent starting from 1998. In addition, the replacement rate for IKA pensioners rises slightly reflecting the above mentioned reduction in contribution evasion following the reduction of the minimum wage relative to the average wage. Finally, the replacement rate for farmers also increases gradually reflecting the introduction of their new primary pension fund.

The main sources of uncertainty: These reflect the following (plus sign implies a reduction in the present value of the net pension liabilities and a negative sign an increase):

(+) An over-estimation of the system's maturity.

(+) No adjustment for the increase in the retirement age of women without under-age children from 60 to 65 under the post-1992 regime (*i.e.* starting from 2025).

(+) No adjustment for the existence of the progressive tax on pensions which exceed certain limits, the implementation of the overall cap on pension receipts, or the changes in dependency allowances and restrictions on multiple pensions under the 1990-1992 reforms.

(+) No adjustment for the elimination of the "35 year" rule.

(?) No increase in the retirement age of male civil servants hired post 1982 to the level of the private sector by 2007. However, the model assumes that all civil servants retire at age 60 from the beginning of the projections, which should broadly offset this factor.

(-) An overestimation of the tightening in eligibility arising from the 1990-1992 reforms. The eligibility ratio falls by about 40 per cent during the projection period.

(-) The assumption that the unemployed do not qualify for any pension.

(-) No specific account is taken for arduous and unhealthy condition for early retirement.

(-) Reduction of contributions for certain self-employed professionals by the amount corresponding to their regimes' receipt of earmarked taxes.

(-) All farmers are assumed to retire at 65 while many receive invalidity pensions earlier.

Table 1. **The structure of pension funds**[1]

	Contributors (per cent of total)	Primary pensions (per cent of total)	Dependency ratio[2]	Main primary funds	Additional coverage by:	
					Supplementary fund	Separation fund
1. Private sector employees	39.5	37.6	1 : 1.9	IKA	Yes	Some
Of which: seamen	0.8	2.7	1 : 0.5	NAT	Yes	Yes
2. Public sector employees	13.8	14.9	1 : 1.6			
General government[3]	9.0	11.7	1 : 1.4	- -	Yes[4]	Yes
Public enterprises and state-owned banks	4.8	3.2	1 : 2.6	Eight funds	Yes	Yes
3. Self-employed						
Agriculture	20.1	36.8	1 : 1.0	OGA	No[5]	No
Non-agriculture	26.7	10.7	1 : 4.4			
Small entrepreneurs and traders	22.0	9.0	1 : 4.3	TEBE	No	Some
Professionals	4.7	1.7	1 : 5.0	Lawyers, doctors, engineers funds	Yes	Yes
Total	100.0	100.0	1 : 1.8			

1. Funds under Ministry of Welfare and Social Security and other ministries.
2. Primary pensions per contributor.
3. Excluding war pensions and pensions for participants in the national resistance.
4. The typical civil servant has two supplementary pensions.
5. The farmer's supplementary fund was turned into a primary fund in 1997.

Source: Ministry of Welfare and Social Security.

Table 2. **Main characteristics of different categories of pension funds (1994)**

	Typical[1] retirement age	Typical[1] contribution years	Contribution base[2]	Average pension[3]	Minimum pension[4]
Private sector wage earners	60	20	107	62	84
of which: NAT	..	13.5	107	62	..
Non-agricultural self-employed					
Small entrepreneurs and traders	62	35	93	48	73
Professionals	65	40	145	124	64
Agriculture	65	n.a	72	14	..
Public servants					
General government	55	25	100	93	42
Public enterprises and banks	55	25	148	134	37

1. The typical characteristics refer to the situation of the most common pensioner as suggested by the data, which are acknowledged to be of poor quality in certain cases. For public employees especially, the retirement age varies according to their date of permanent employment.
2. Earnings *per capita* for a group of individuals belonging to the selected fund (OECD estimates derived from national accounts data) as a percentage of the national average earnings *per capita*. For the self-employed, the actual contribution base is far below earnings.
3. Old age pension *per capita*, including supplementary, for the specific fund as a percentage of the national average earnings *per capita.*
4. Ratio of minimum primary old-age pension to average old-age primary pension.

Source: Ministry of Welfare and Social Security and OECD estimates.

Table 3. **Contribution and replacement rates in 1995**

(Percentage points unless otherwise indicated)

	Contribution rate[1]				Old-age replacement rates			
	Statutory		Effective[2]		Statutory[3]		Effective[2]	
	Total[4]	Primary	Total[4]	Primary	Total[4]	Primary	Total[4]	Primary
Private sector wage earners (IKA)	26	20	19	15	90-110	70-90	62	49
Seamen (NAT)	n.a	15-23	28	21	100	80	65	53
Small entrepreneurs and traders (TEBE)[5]	20	20	8	8	90	90	54	54
Professionals[5]	n.a	n.a	13	5	n.a	80	90	55
Farmers (OGA)[5]								
Old	4	..	1	0	n.a	n.a	20	16
New	7	7	..	..	70	70	..	..
Civil servants[6]	15.75	6.75	12	6	152[7]	80	109[7]	80
Public enterprises and state-owned banks[8]	42	33	26	21	100	80	98	80
Total	..	..	14	10	..	..	53	41
Memorandum:								
Post-1992 new entrants into work force	26[9]	20[9]	..	..	80	60	..	..

1. Employer and employee contributions.
2. The effective contribution and replacement rates are derived from the actual pension expenditure and contribution using national accounts data for the derivation of sectoral earnings.
3. For 35 years' contributions.
4. Primary and supplementary pensions.
5. Contributions and pensions based on either fixed or voluntary income classes, which are often unrelated to actual earnings. Statutory contribution and replacement rates are based on these nominal values, and the median income class where applicable. Effective contribution rates are often biased upwards by the inclusion of receipts from earmarked taxes.
6. Excluding the participation of Government as employer. Employee contributions for primary pensions were introduced in 1993 and the rate raised to that in the private sector by 1995.
7. Includes two supplementary pensions.
8. Statutory rates are proxied by those of the Public Electricity Company (DEH).
9. Excludes government contribution amounting to 10 percentage points.

Source: Social Security Budget and OECD estimates.

Table 4. **Baseline scenario**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	35	35	35	35	35	35	35
Age at retirement	60	60	60	60	60	60	60
Age at start of pension collection	60	60	60	60	60	60	60
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	n.a	n.a	n.a	n.a	n.a	n.a.
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	196	196	196	196	196	196	196
Average lifetime monthly wage	143	143	143	143	143	143	143
Pension base	188	196	196	143	196	188	143
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	199	294	196	186	56	151	100
Basic	143	157	157	186	29	113	100
Supplementary	56	137	39	0	27	38	0
Separation (lump sum)	0	8345	5882	0	0	0	0
Replacement rate	101	150	100	95	29	77	51
Basic	73	80	80	95	15	58	51
Supplementary	28	70	20	0	14	19	0
Separation (lump sum) % of yearly wage	0	304	214	0	0	0	0
Ratio of entitlement to contributions[1]	146	538	257	178	222	111	91
Basic	136	475	299	178	n.a	108	91
Supplementary	177	919	274	n.a	108	120	n.a
Separation	n.a	3040	1429	n.a	n.a	n.a	n.a
Rate of return on contributions	1.1	4.9	2.7	1.7	2.3	0.3	-0.3
Basic	0.9	4.6	3.2	1.7	n.a	0.2	-0.3
Supplementary	1.6	6.5	2.9	n.a	0.2	0.5	n.a
Separation	n.a	10.2	7.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 5. **Scenario – Baseline including survivors' pensions**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	35	35	35	35	35	35	35
Age at retirement	60	60	60	60	60	60	60
Age at start of pension collection	60	60	60	60	60	60	60
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	85	85	85	85	n.a	85	85
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	196	196	196	196	196	196	196
Average lifetime monthly wage	143	143	143	143	143	143	143
Pension base	188	196	196	143	196	188	143
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	199	294	196	186	56	151	100
Basic	143	157	157	186	29	113	100
Supplementary	56	137	39	0	27	38	0
Separation (lump sum)	0	8345	5882	0	0	0	0
Replacement rate	101	150	100	95	29	77	51
Basic	73	80	80	95	15	58	51
Supplementary	28	70	20	0	14	19	0
Separation (lump sum) % of yearly wage	0	304	214	0	0	0	0
Ratio of entitlement to contributions[1]	206	609	289	243	222	157	129
Basic	193	537	336	243	n.a	153	129
Supplementary	251	1040	308	n.a	108	170	n.a
Separation	n.a	3040	1429	n.a	n.a	n.a	n.a
Rate of return on contributions	2.1	5.3	3.1	2.6	2.3	1.3	0.7
Basic	1.9	4.9	3.5	2.6	n.a	1.2	0.7
Supplementary	2.7	6.9	3.3	n.a	0.2	1.5	n.a
Separation	n.a	10.2	7.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 6. **Scenario – Receive pension at age 65 and maintain survivor's pension**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	35	35	35	35	35	35	35
Age at retirement	60	60	60	60	60	60	60
Age at start of pension collection	65	65	65	65	65	65	65
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	85	85	85	85	85	85	85
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	196	196	196	196	196	196	196
Average lifetime monthly wage	143	143	143	143	143	143	143
Pension base	188	196	196	143	196	188	143
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	199	294	196	186	56	151	100
Basic	143	157	157	186	29	113	100
Supplementary	56	137	39	0	27	38	0
Separation (lump sum)	0	8457	5882	0	0	0	0
Replacement rate	101	150	100	95	29	77	51
Basic	73	80	80	95	15	58	51
Supplementary	28	70	20	0	14	19	0
Separation (lump sum) % of yearly wage	0	308	214	0	0	0	0
Ratio of entitlement to contributions[1]	153	552	260	177	140	116	95
Basic	143	486	303	177	n.a	113	95
Supplementary	186	942	278	n.a	68	126	n.a
Separation	n.a	3081	1429	n.a	n.a	n.a	n.a
Rate of return on contributions	1.2	5.0	2.8	1.7	1.0	0.4	-0.1
Basic	1.0	4.6	3.2	1.7	n.a	0.4	-0.1
Supplementary	1.8	6.6	3.0	n.a	-1.1	0.7	n.a
Separation	n.a	10.3	7.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 7. **Scenario – Discount rate raised to 4 per cent**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	35	35	35	35	35	35	35
Age at retirement	60	60	60	60	60	60	60
Age at start of pension collection	60	60	60	60	60	60	60
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	196	196	196	196	196	196	196
Average lifetime monthly wage	143	143	143	143	143	143	143
Pension base	188	196	196	143	196	188	143
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	199	294	196	186	56	151	100
Basic	143	157	157	186	29	113	100
Supplementary	56	137	39	0	27	38	0
Separation (lump sum)	0	8345	5882	0	0	0	0
Replacement rate	101	150	100	95	29	77	51
Basic	73	80	80	95	15	58	51
Supplementary	28	70	20	0	14	19	0
Separation (lump sum) % of yearly wage	0	304	214	0	0	0	0
Ratio of entitlement to contributions[1]	91	366	174	111	138	69	57
Basic	85	322	203	111	n.a	67	57
Supplementary	110	624	186	n.a	67	75	n.a
Separation	n.a	2144	1007	n.a	n.a	n.a	n.a
Rate of return on contributions	-0.3	`3.8	1.6	0.3	0.9	-1.1	-1.6
Basic	-0.5	3.4	2.0	0.3	n.a	-1.1	-1.6
Supplementary	0.3	5.4	1.8	n.a	-1.1	-0.8	n.a
Separation	n.a	9.2	6.8	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	4.0	4.0	4.0	4.0	4.0	4.0	4.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

So*urce:* OECD calculations based on formulae provided by the Greek authorities.

Table 8. **Scenario – Discount rate and real wage growth raised to 4 per cent**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	35	35	35	35	35	35	35
Age at retirement	60	60	60	60	60	60	60
Age at start of pension collection	60	60	60	60	60	60	60
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	4	4	4	4	4	4	4
Final wage	379	379	379	379	379	379	379
Average lifetime monthly wage	210	210	210	210	210	210	210
Pension base	350	379	379	210	379	350	210
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	375	568	379	286	82	280	147
Basic	266	304	304	286	29	210	147
Supplementary	110	265	76	0	53	70	0
Separation (lump sum)	0	16190	11383	0	0	0	0
Replacement rate	99	150	100	75	22	74	39
Basic	70	80	80	75	8	55	39
Supplementary	29	70	20	0	14	18	0
Separation (lump sum) % of yearly wage	0	305	214	0	0	0	0
Ratio of entitlement to contributions[1]	126	519	247	124	147	94	61
Basic	116	458	288	124	n.a	91	61
Supplementary	159	887	264	n.a	95	102	n.a
Separation	n.a	3048	1429	n.a	n.a	n.a	n.a
Rate of return on contributions	0.7	4.8	2.6	0.6	1.1	-0.2	-1.4
Basic	0.4	4.4	3.1	0.6	n.a	-0.3	-1.4
Supplementary	1.3	6.4	2.8	n.a	-0.1	0	n.a
Separation	n.a	10.3	7.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	4.0	4.0	4.0	4.0	4.0	4.0	4.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 9. **Scenario – Work for 25 years and retire at age 50**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	25	25	25	25	25	25	25
Age at retirement	50	50	50	50	50	50	50
Age at start of pension collection	50	50	50	50	50	50	50
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	161	161	161	161	161	161	161
Average lifetime monthly wage	128	128	128	128	128	128	128
Pension base	155	161	161	128	161	155	128
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	114	144	80	114	45	88	64
Basic	75	64	64	114	29	66	64
Supplementary	39	80	16	0	16	22	0
Separation (lump sum)	0	4890	4021	0	0	0	0
Replacement rate	71	90	50	71	28	55	40
Basic	47	40	40	71	18	41	40
Supplementary	24	50	10	0	10	14	0
Separation (lump sum) % of yearly wage	0	217	179	0	0	0	0
Ratio of entitlement to contributions[1]	218	585	291	283	459	168	151
Basic	187	430	339	283	n.a	164	151
Supplementary	323	1190	3211	n.a	164	182	n.a
Separation	n.a	3040	1667	n.a	n.a	n.a	n.a
Rate of return on contributions	3.2	7.3	4.4	4.2	6.3	2.1	1.7
Basic	2.5	6.0	5.0	4.2	n.a	2.0	1.7
Supplementary	4.8	10.4	4.6	n.a	2.0	2.4	n.a
Separation	n.a	14.6	11.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 10. **Scenario – Work for 25 years and retire at age 60**

	IKA	Civil servants	Bank/ Pub. Ent. (proxied by DEH)	TEBE	OGA	New system	New OGA
Age at which first employed	25	25	25	25	25	25	25
Number of years employed	25	25	25	25	25	25	25
Age at retirement	50	50	50	50	50	50	50
Age at start of pension collection	60	60	60	60	60	60	60
Age at end of pension collection	75	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Starting monthly wage	100	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2	2
Final wage	161	161	161	161	161	161	161
Average lifetime monthly wage	128	128	128	128	128	128	128
Pension base	155	161	161	128	161	155	128
Contribution rate:	26	33	48	20	5	26	21
Employee	10	20	20	20	5	10	7
Employer	16	13	29	0	0	16	14
Contributions at start of career	26	33	48	20	5	26	21
Value of monthly pension	114	144	80	114	45	88	64
Basic	75	64	64	114	29	66	64
Supplementary	39	80	16	0	16	22	0
Separation (lump sum)	0	5028	4021	0	0	0	0
Replacement rate	71	90	50	71	28	55	40
Basic	47	40	40	71	18	41	40
Supplementary	24	50	10	0	10	14	0
Separation (lump sum) % of yearly wage	0	223	179	0	0	0	0
Ratio of entitlement to contributions[1]	118	496	253	153	248	91	82
Basic	101	364	295	153	n.a	89	82
Supplementary	174	1008	270	n.a	88	98	n.a
Separation	n.a	3126	1667	n.a	n.a	n.a	n.a
Rate of return on contributions	0.7	6.6	3.8	1.7	3.7	-0.4	-0.8
Basic	0.0	5.3	4.4	1.7	n.a	-0.5	-0.8
Supplementary	2.2	9.7	4.1	n.a	-0.5	-0.1	n.a
Separation	n.a	14.8	11.9	n.a	n.a	n.a	n.a
Memorandum item:							
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

Table 11. **Scenario – Pension options under IKA**

	Baseline		Arduous and unhealthy conditions		Minimum pension	
Age at which first employed	25	25	25	25	50	50
Number of years employed	35	35	35	35	15	15
Age at retirement	60	60	60	60	65	65
Age at start of pension collection	65	65	60	60	65	65
Age at end of pension collection	75	75	75	75	75	75
Age until which survivor's pension collected	n.a	85	n.a	85	n.a	85
Starting monthly wage	100	100	100	100	100	100
Rate of growth of average wage (%)	2	2	2	2	2	2
Final wage	196	196	196	196	132	132
Average lifetime monthly wage	143	143	143	143	115	115
Pension base	188	188	188	188	127	127
Contribution rate:	26	26	32	32	26	26
Employee	10	10	13	13	10	10
Employer	16	16	19	19	16	16
Contributions at start of career	26	26	32	32	26	26
Value of monthly pension	199	199	199	199	121	121
Basic	143	143	143	143	94	94
Supplementary	56	56	56	56	27	27
Separation (lump sum)	0	0	0	0	0	0
Replacement rate	101	101	101	101	92	92
Basic	73	73	73	73	71	71
Supplementary	28	28	28	28	20	20
Separation (lump sum) % of yearly wage	0	0	0	0	0	0
Ratio of entitlement to contributions[1]	92	153	120	170	215	356
Basic	86	143	116	164	217	360
Supplementary	112	186	133	188	208	345
Separation	n.a	n.a	n.a	n.a	n.a	n.a
Rate of return on contributions	-0.2	1.2	0.5	1.5	5.2	8.8
Basic	-0.4	1.0	0.4	1.4	5.3	8.9
Supplementary	0.3	1.8	0.8	1.8	5.0	8.6
Separation	n.a	n.a	n.a	n.a	n.a	n.a
Memorandum item:						
Rate of discount	2.0	2.0	2.0	2.0	2.0	2.0

n.a not applicable.

1. Both entitlements and contributions are discounted to present value terms.

Source: OECD calculations based on formulae provided by the Greek authorities.

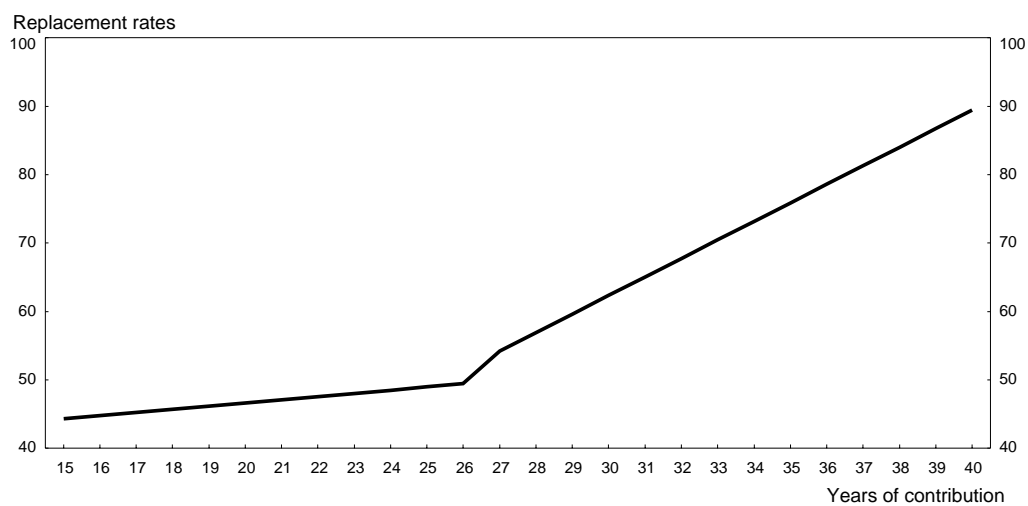Table 12. **Implicit gross liabilities of the public pension system**[1]

(Present value of expenditure minus contributions)

	Baseline scenario		Alternative scenarios (as a percentage of 1994 GDP)			
	As a percentage of 1994 GDP	As a percentage of total revenue	Increase in effective contribution rate by 50 per cent from 2010	Decrease in effective replacement rate by 50 per cent from 2010	Increase in effective retirement age by 5 years from 2000[2]	Increase in effective retirement age by 10 years from 2000[3]
IKA and Other	61	52	27	11	30	-3
NAT	12	424	11	9	10	7
Self-employed						
Small entrepreneurs and traders	13	42	4	0	6	-1
Professionals[4]	3	38	1	0	3	1
OGA	45	469	42	36	45	37
Civil servants[5]	49	230	43	34	39	29
Public enterprises and banks	10	50	4	3	4	-2
Total	193	92	132	93	137	68

1. The OECD estimates exclude earmarked taxes, government transfers, tripartite financing and all other non-contribution based revenue. The model's assumptions are described in Annex III.
2. Except for the case of self-employed professionals and farmers, where the baseline scenario assumes retirement age of 65.
3. Except for the case of self-employed professionals and farmers, where the retirement age is increased by 5 years.
4. The results for self-employed professionals are biased by the inability in many cases to separate out earmarked taxes from earnings based contributions.
5. Excluding the participation of Government as an employer. Including a government participation equivalent to twice the employees' contribution would reduce the present value of net liabilities to 42 per cent of 1994 GDP.
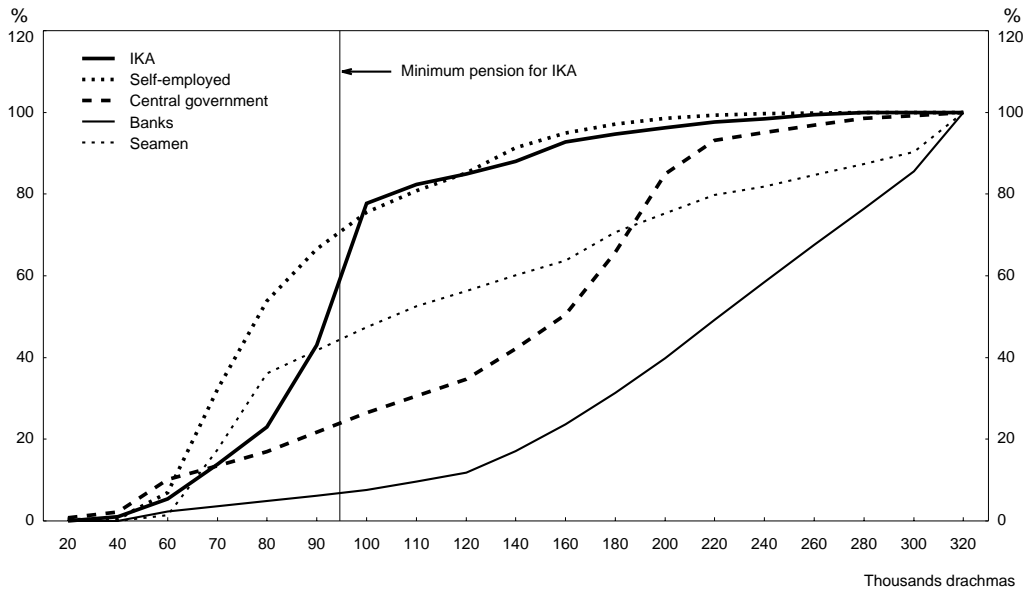
Source: Social Security Budget.

Figure 1. INTERACTION OF REPLACEMENT RATES AND THE MINIMUM PRIMARY PENSION FOR IKA IN 1995 (1)
13th bracket, per cent of pension base

Replacement rates

```
100 |                                                              | 100
    |                                                              |
 90 |                                                        ___   | 90
    |                                                    ___/      |
 80 |                                                ___/          | 80
    |                                             __/              |
 70 |                                         ___/                 | 70
    |                                      __/                     |
 60 |                                  ___/                        | 60
    |                               __/                            |
 50 |                            __/                               | 50
    |        _____---/                                  |
 40 |_____| 40
     15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
                                                        Years of contribution
```

1. The pension formula for IKA provides higher replacement rates for lower incomes. Contributors are placed into 28 income
   brackets, with identical replacement rate formulas for the highest 15 income brackets. Most insured fall in the 13th
   income bracket. From 1992, the minimum pension was increased by 1 per cent for each year of contributions after the 15th year.
   For lower income brackets, the minimum pension exceeds the pension derived from the pension formula for 35 years contributions.
Source: IKA.

Figure 2. CUMULATIVE DISTRIBUTION OF PRIMARY PENSION LEVELS FOR MAJOR EMPLOYMENT CATEGORIES
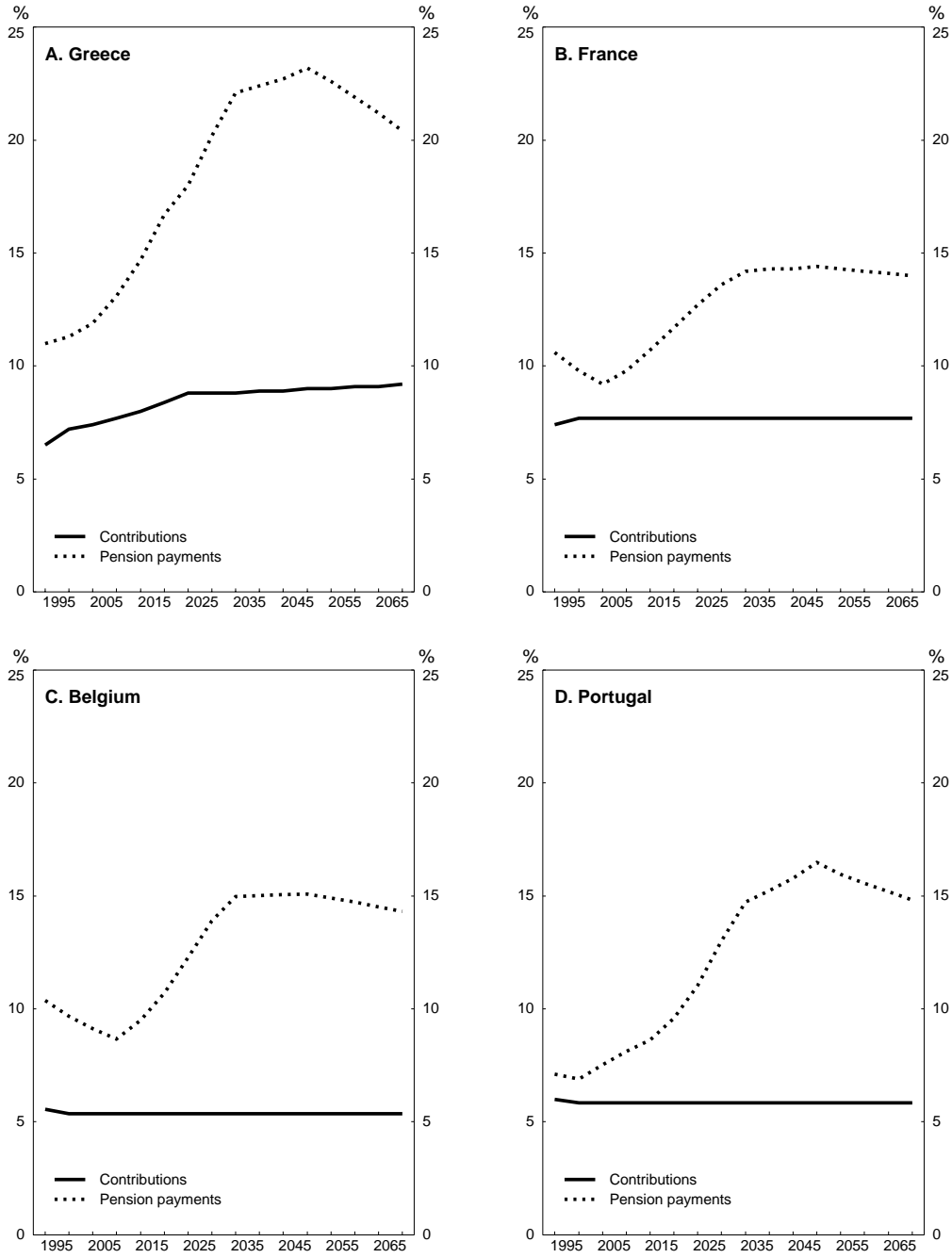(1995)

Source: Social Security budgets.

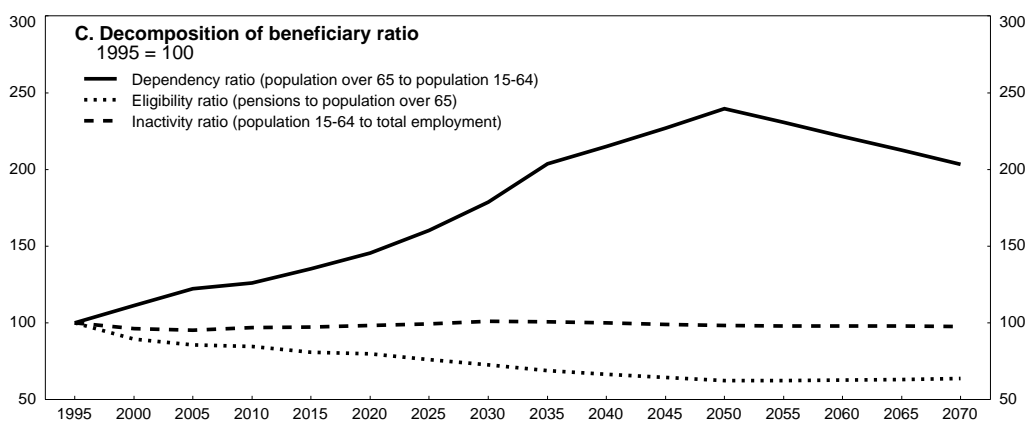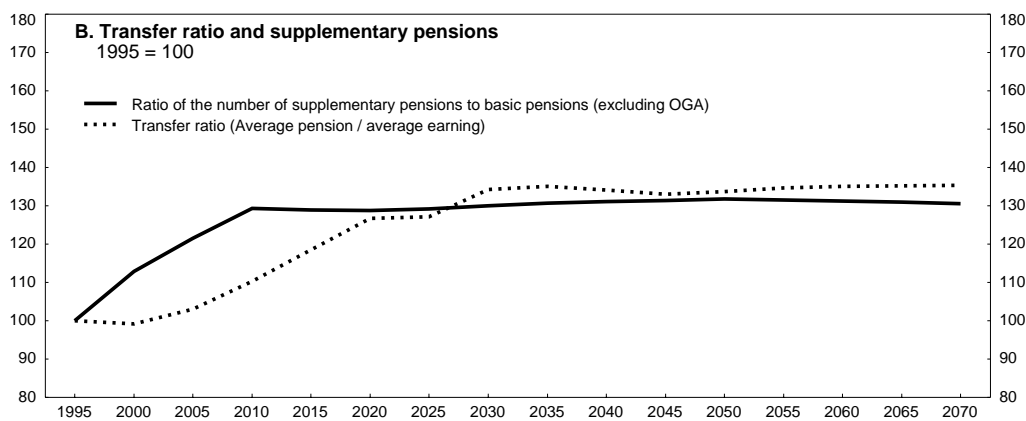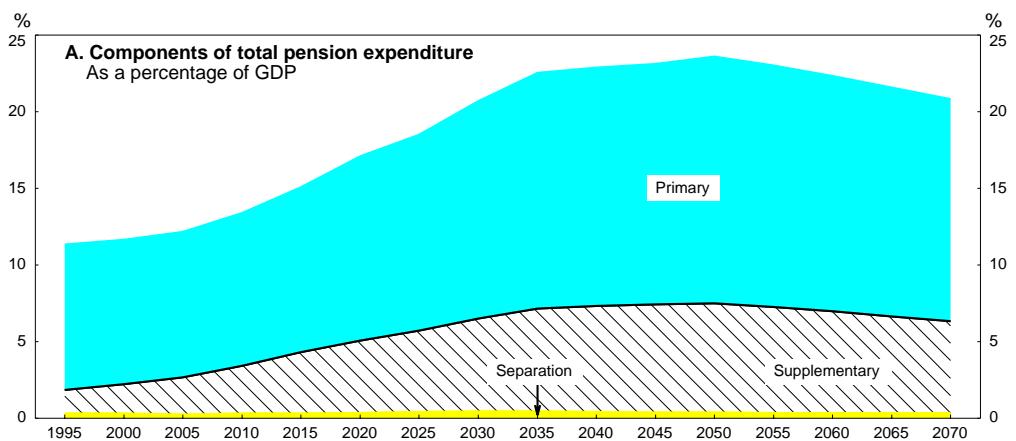**Figure 3. ELDERLY DEPENDENCY RATIOS (1)**
Per cent
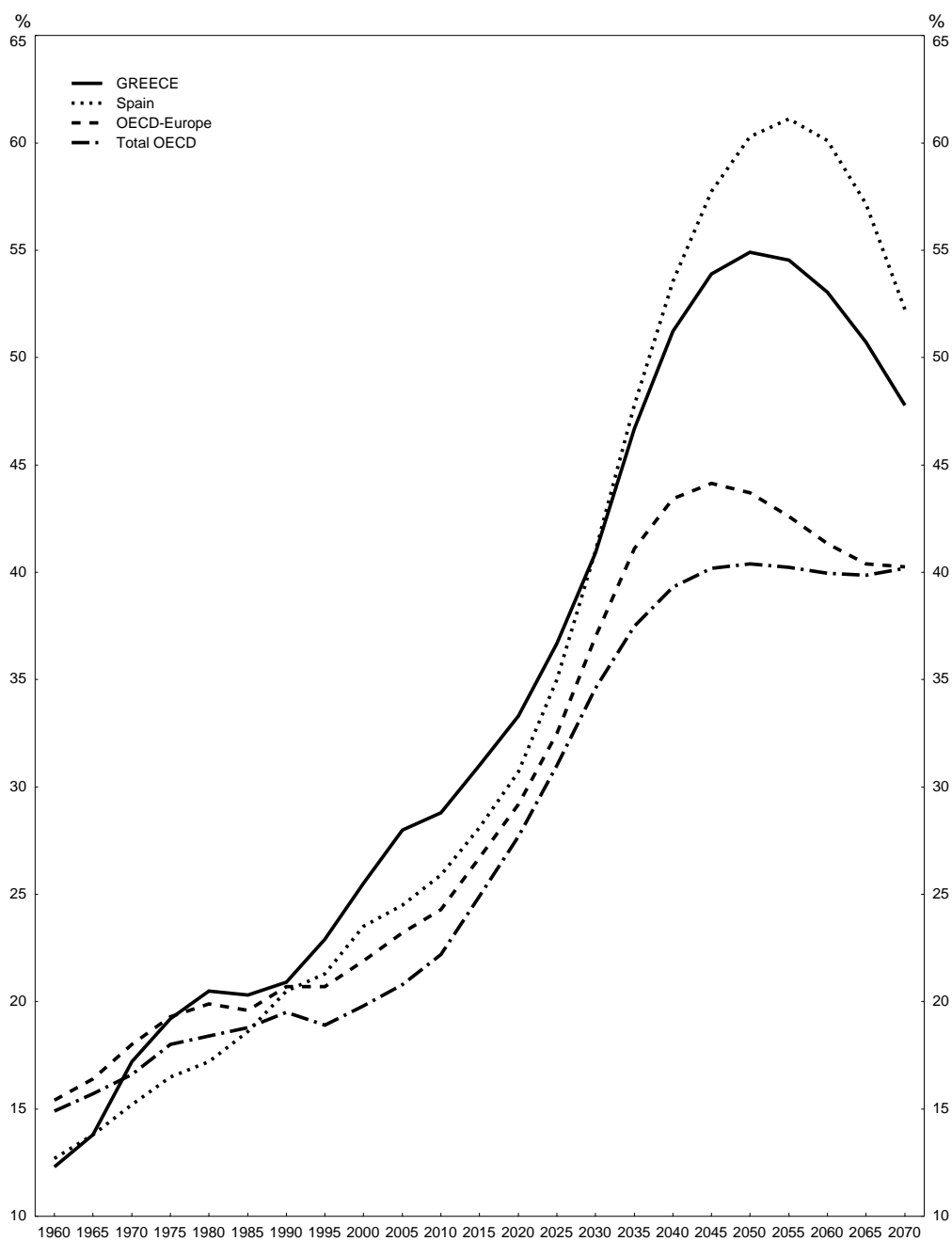
1. Population aged 65 and over as a per cent of working age population.
Source: World Bank.

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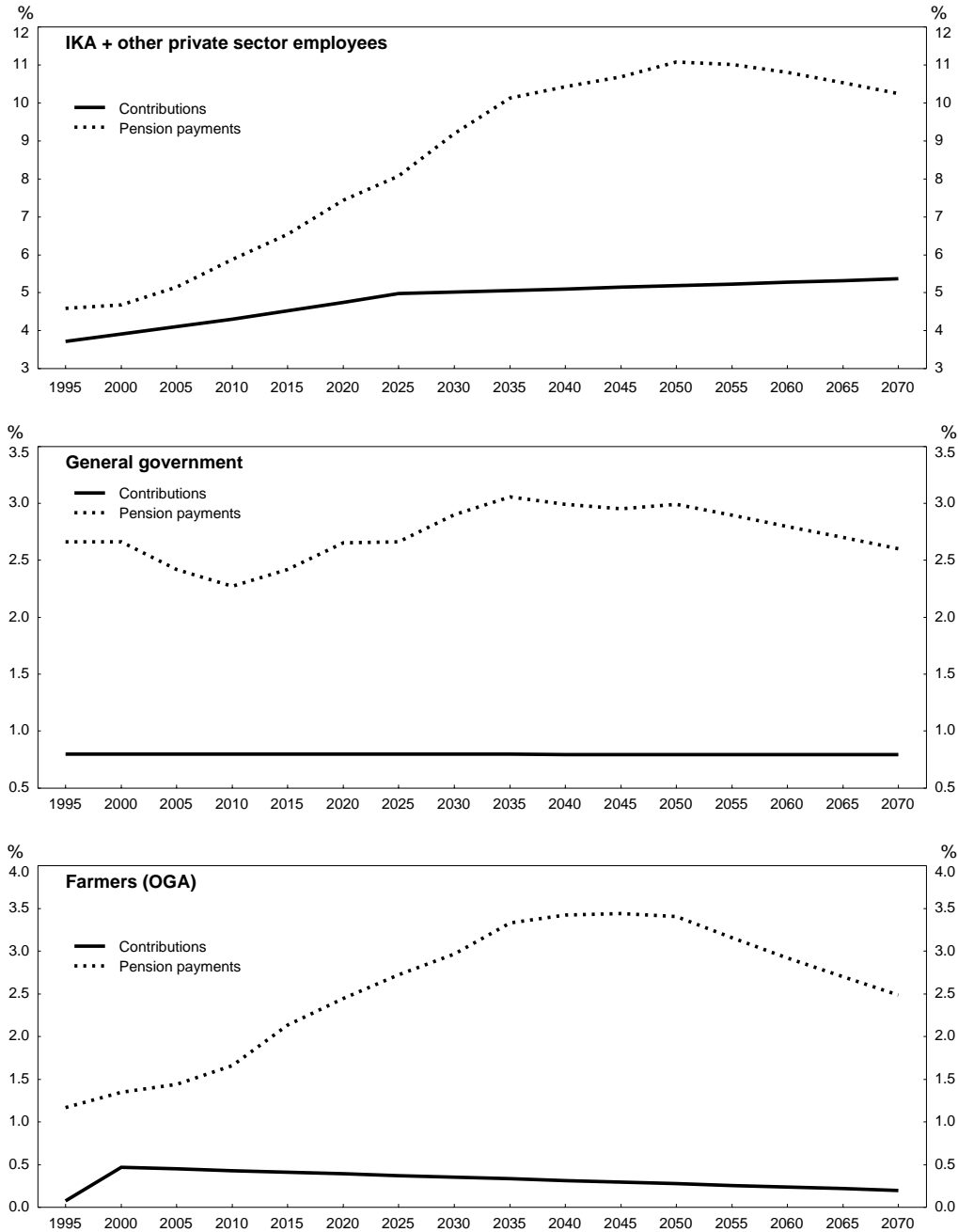**Figure 4. PENSION PAYMENTS AND CONTRIBUTIONS SIMULATION**
As a percentage of GDP
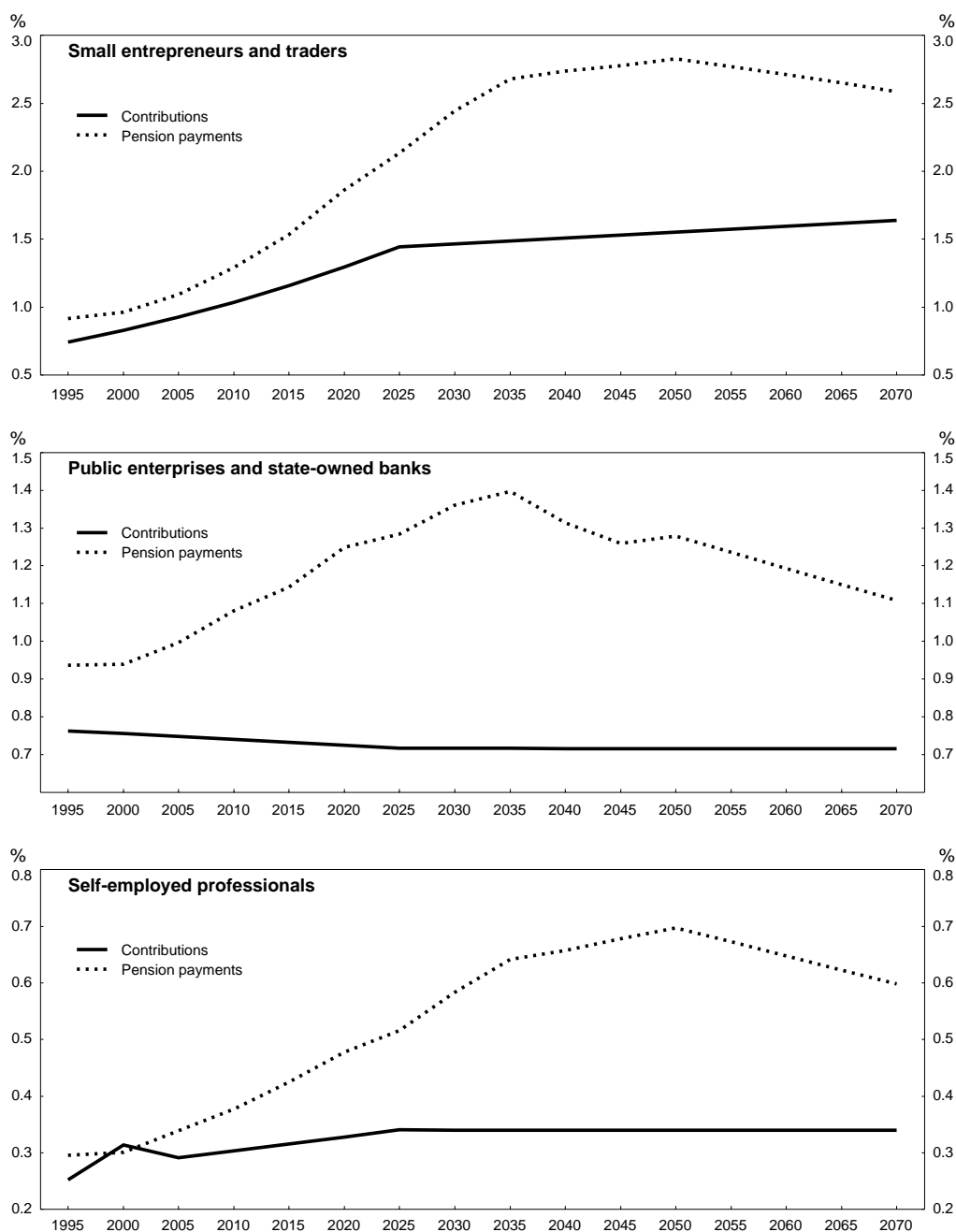

Source: OECD.

Figure 5. EXPENDITURE ON PENSIONS

A. Components of total pension expenditure — As a percentage of GDP (Primary, Separation, Supplementary)

B. Transfer ratio and supplementary pensions (1995 = 100)
— Ratio of the number of supplementary pensions to basic pensions (excluding OGA)
···· Transfer ratio (Average pension / average earning)

C. Decomposition of beneficiary ratio (1995 = 100)
— Dependency ratio (population over 65 to population 15-64)
···· Eligibility ratio (pensions to population over 65)
- - Inactivity ratio (population 15-64 to total employment)

Source: OECD.

Figure 6. INDIVIDUAL SECTOR PENSION SIMULATIONS (1)
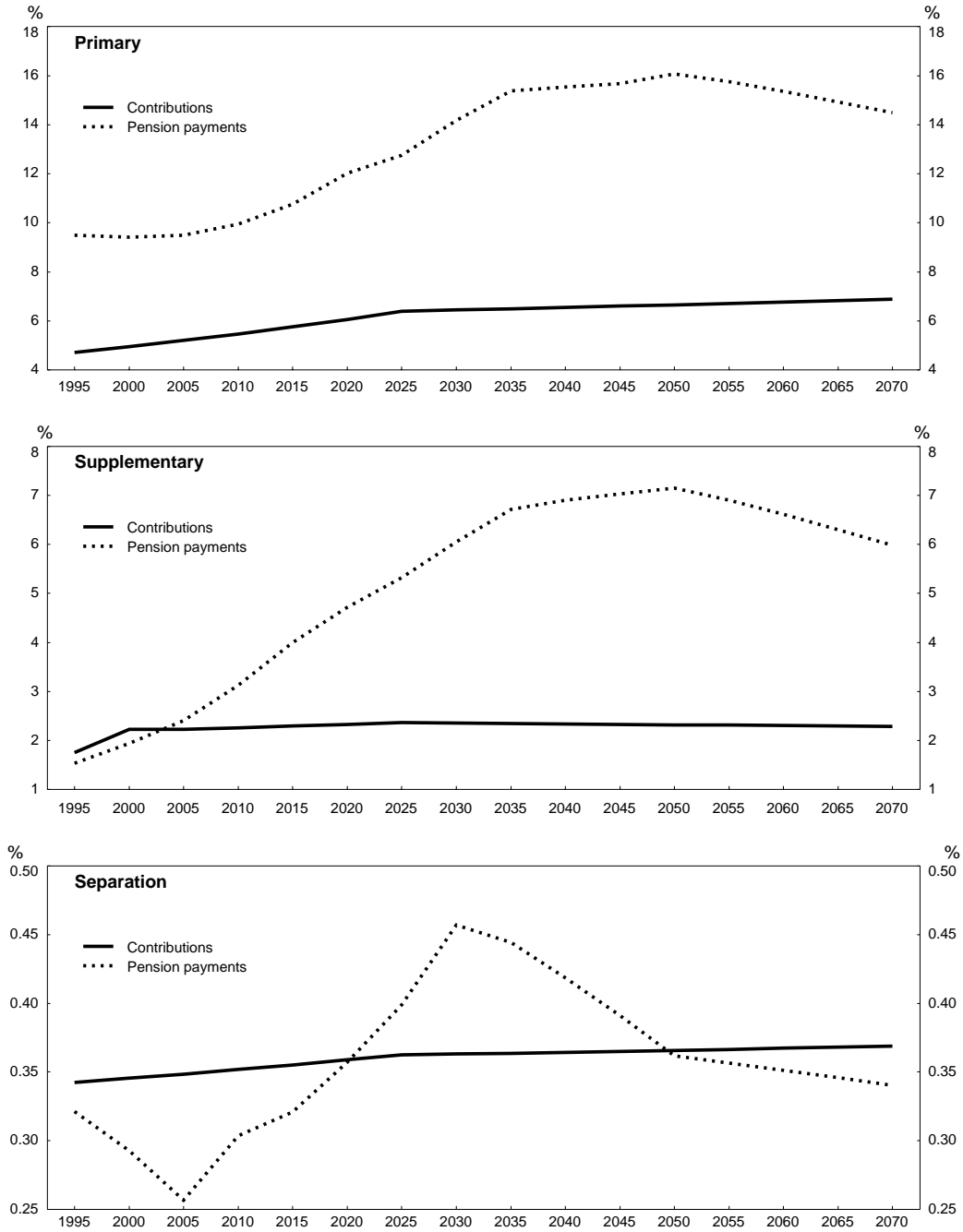As a per cent of GDP

1. Includes primary and supplementary pensions.
Source: OECD.

Figure 6. INDIVIDUAL SECTOR PENSION SIMULATIONS (Cont.) (1)
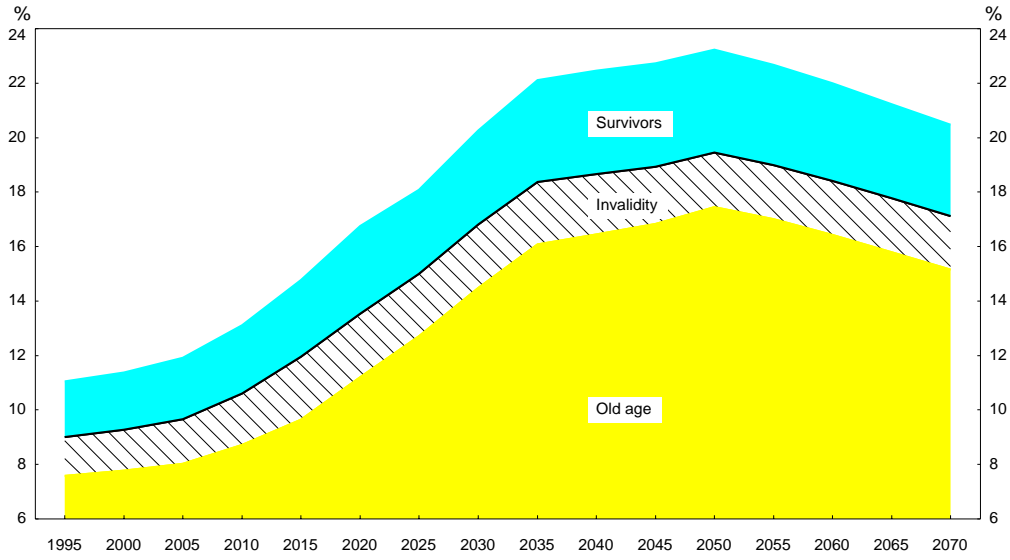As a per cent of GDP

1. Includes primary and supplementary pensions.
Source: OECD.

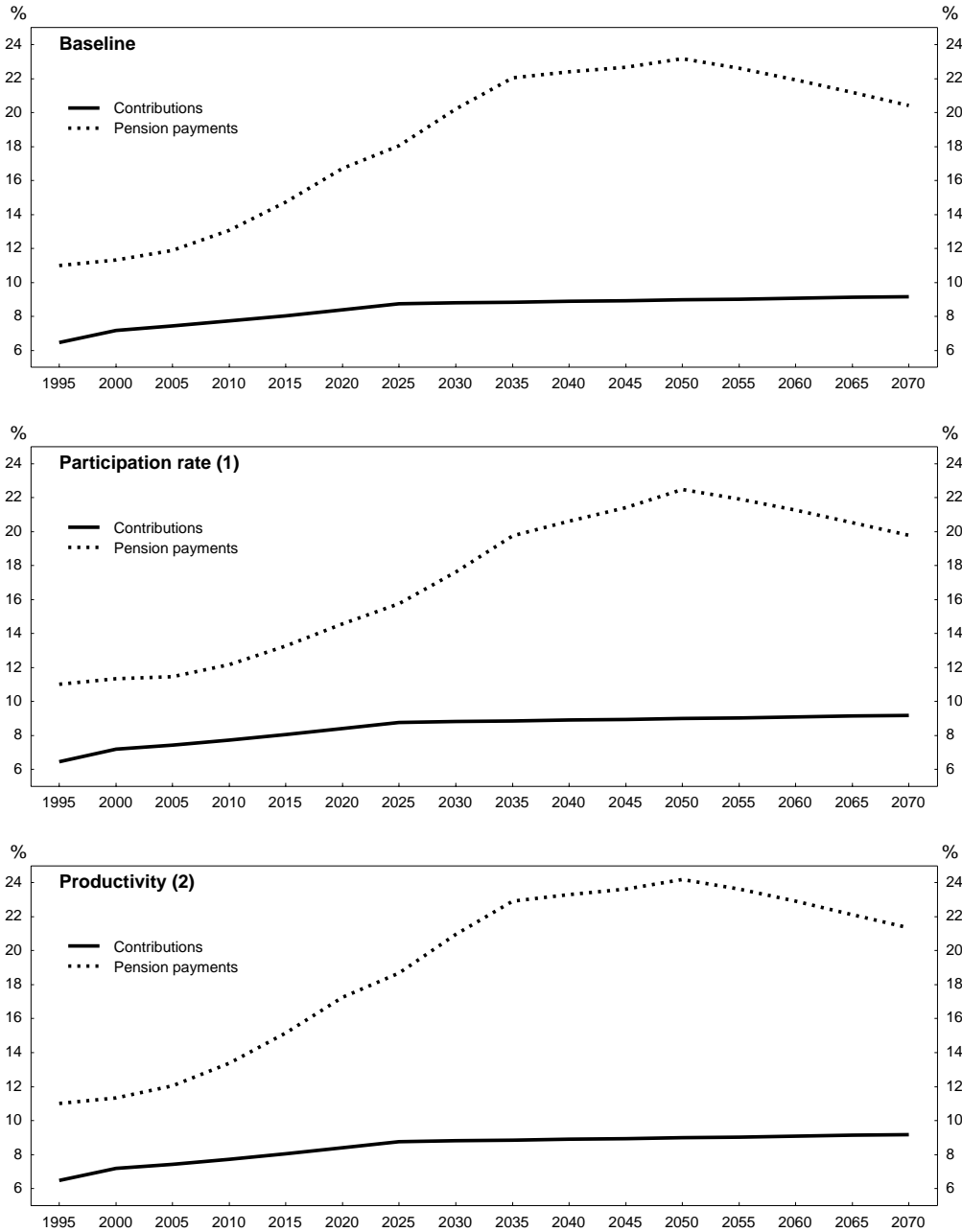**Figure 7. PENSION SIMULATIONS ACCORDING TO TYPE OF PENSION**
As a per cent of GDP

Source: OECD.

Figure 7. PENSION SIMULATIONS ACCORDING TO TYPE OF PENSION (Cont.)
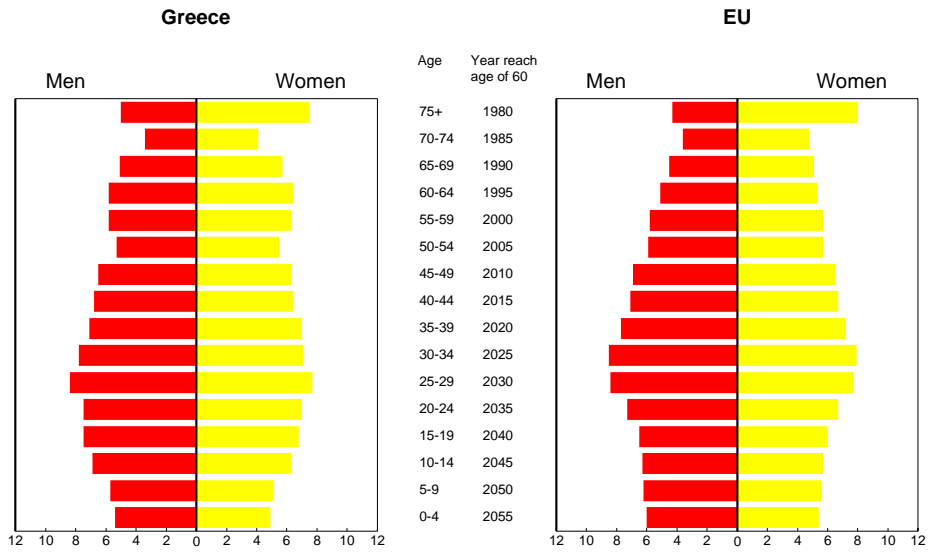As a per cent of GDP

Source: OECD.

Figure 8. ALTERNATIVE ASSUMPTIONS
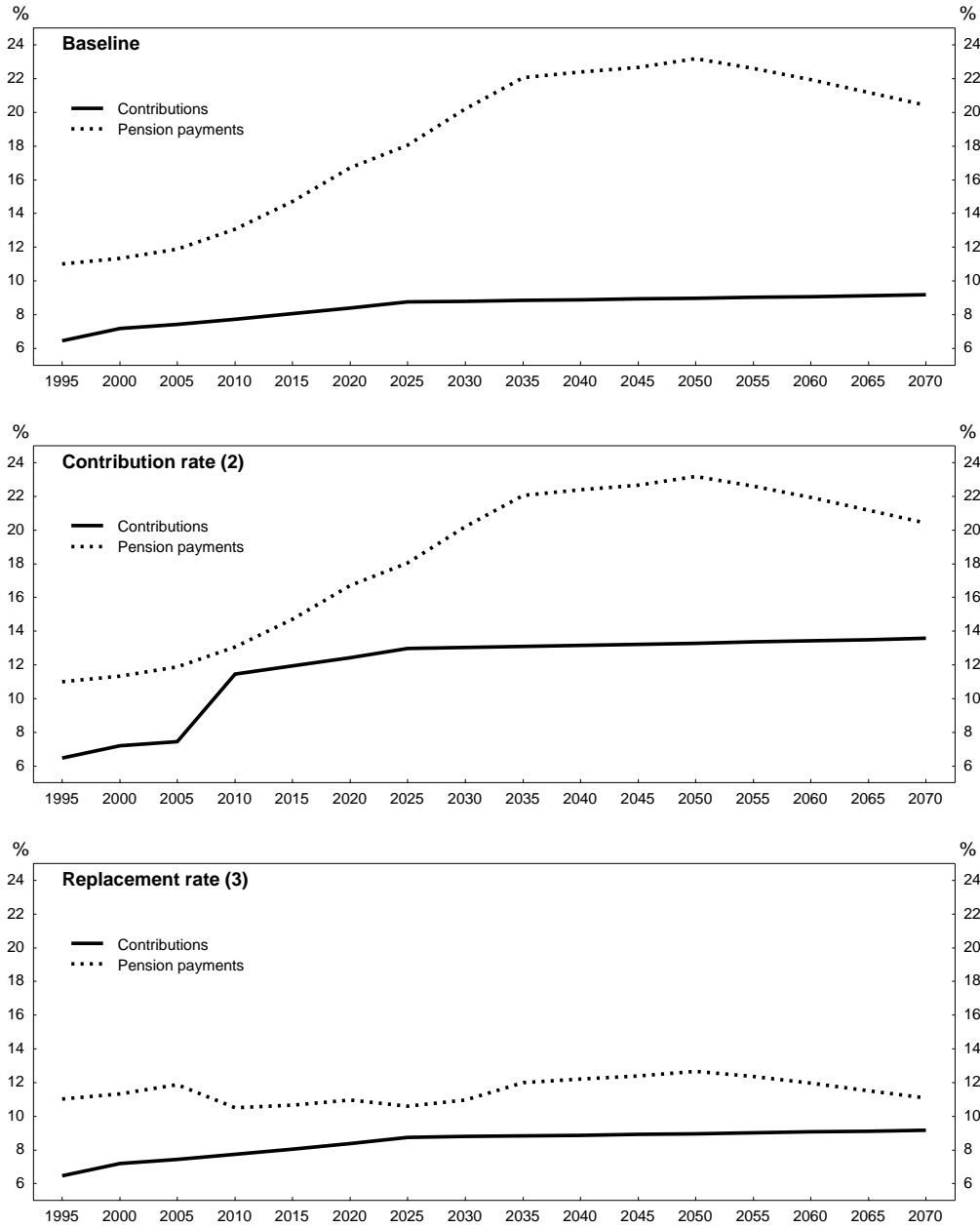As a per cent of GDP

1. Increase in participation rate to EU average.
2. Decrease in productivity to 1 per cent from 1.5 per cent.
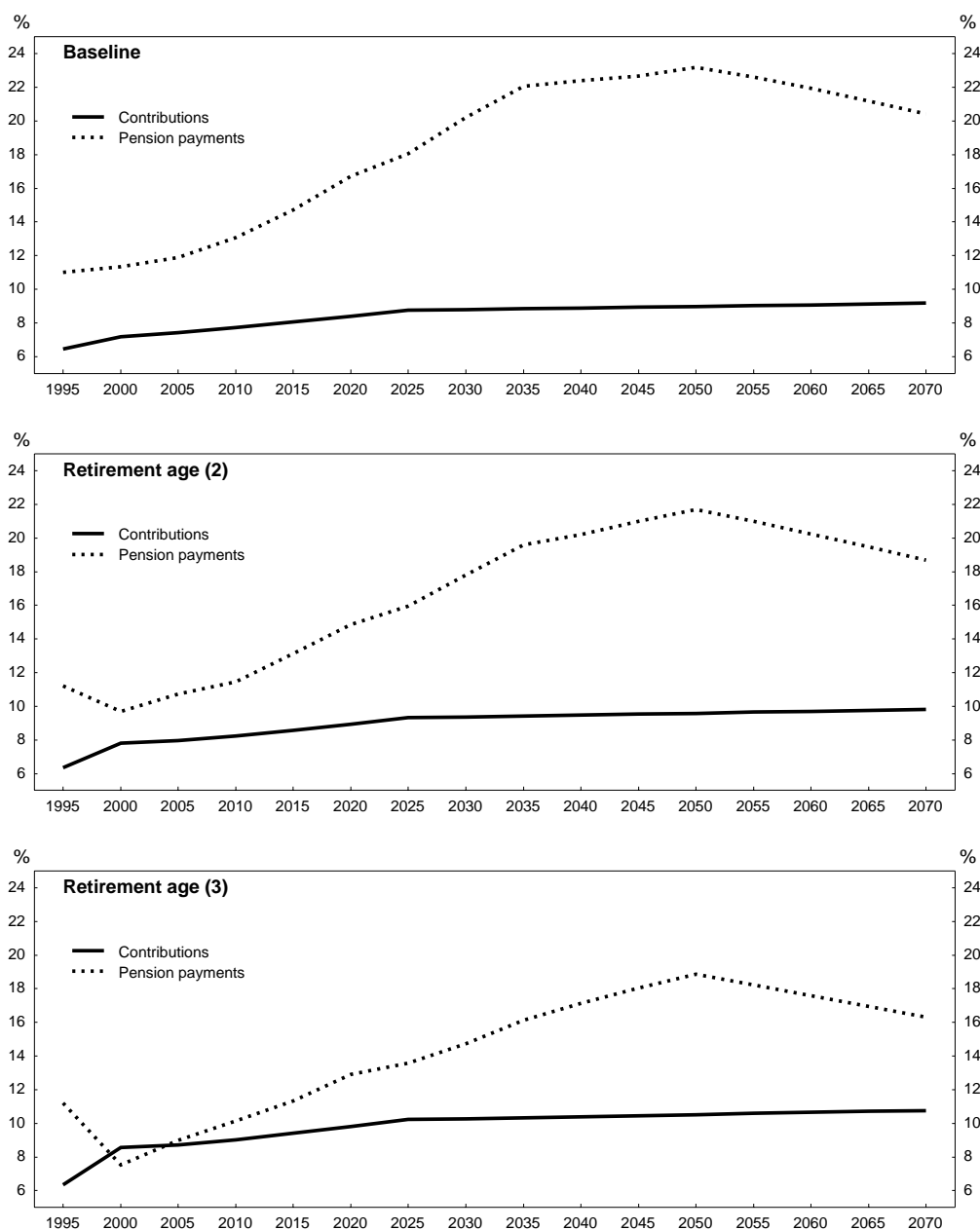Source: OECD.

Figure 9. POPULATION COMPOSITION
1995

		Age	Year reach age of 60		
Greece				**EU**	
Men	Women			Men	Women
		75+	1980		
		70-74	1985		
		65-69	1990		
		60-64	1995		
		55-59	2000		
		50-54	2005		
		45-49	2010		
		40-44	2015		
		35-39	2020		
		30-34	2025		
		25-29	2030		
		20-24	2035		
		15-19	2040		
		10-14	2045		
		5-9	2050		
		0-4	2055		

Source: World Bank.

55

Figure 10. ADJUSTMENT SCENARIOS (1)
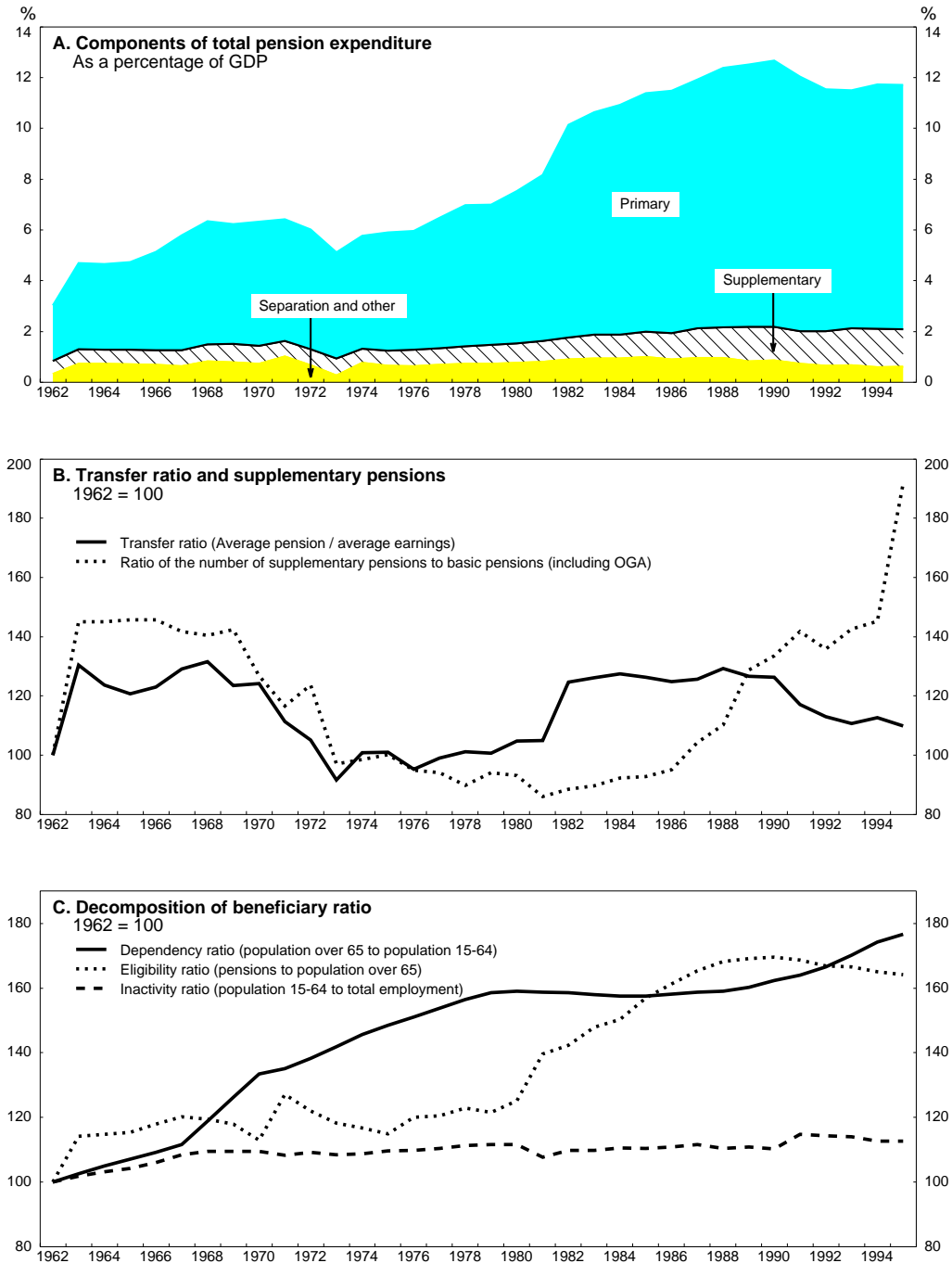As a per cent of GDP

1. Includes primary and supplementary pensions.
2. Increase in effective contribution rate by 50% from 2010.
3. Decrease in effective replacement rate by 50% from 2010.
Source: OECD.

Figure 10. ADJUSTMENT SCENARIOS (Cont.) (1)
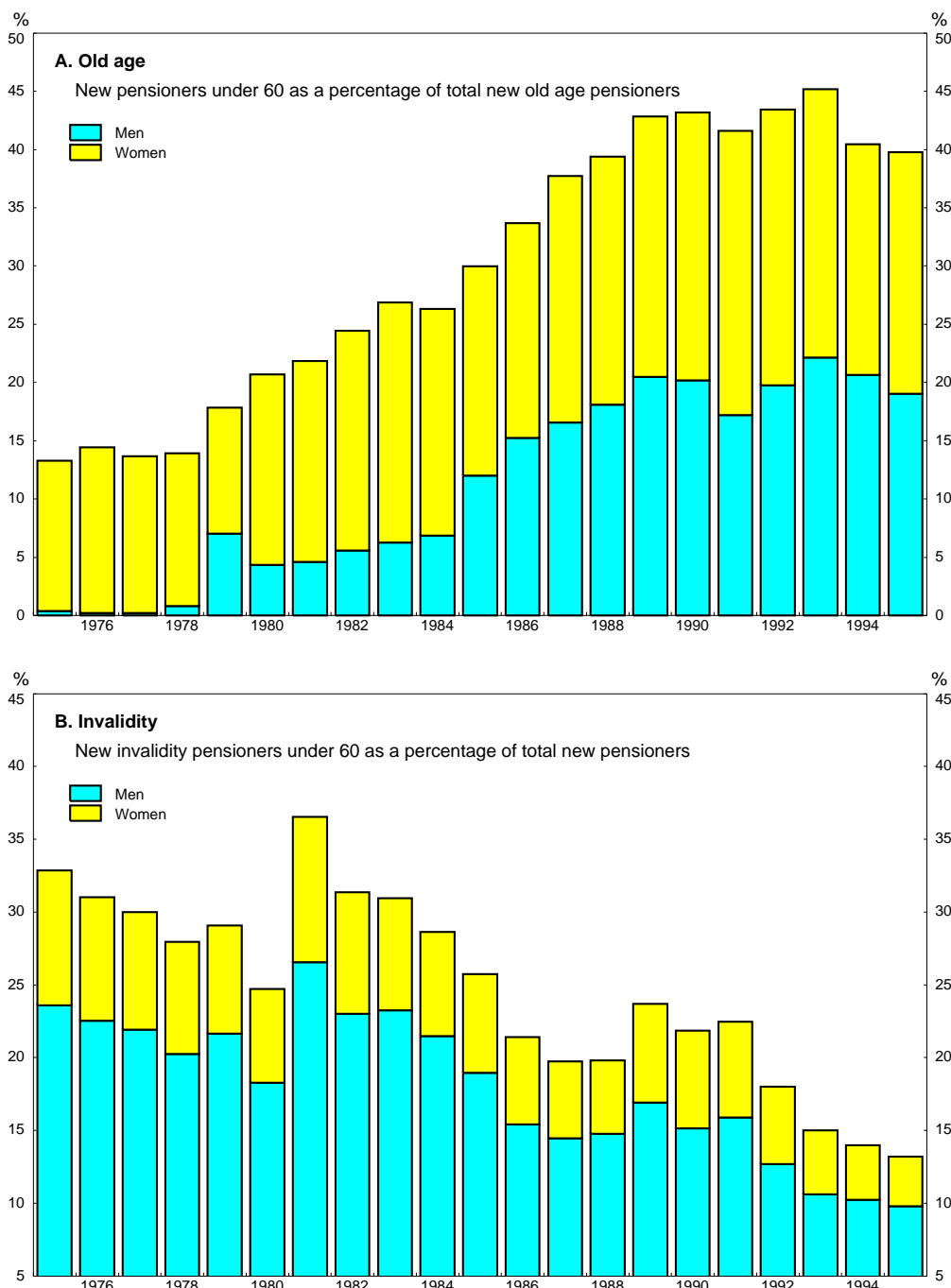As a per cent of GDP

1. Includes primary and supplementary pensions.
2. Increase in effective retirement age by 5 years from 2000.
3. Increase in effective retirement age by 10 years from 2000.
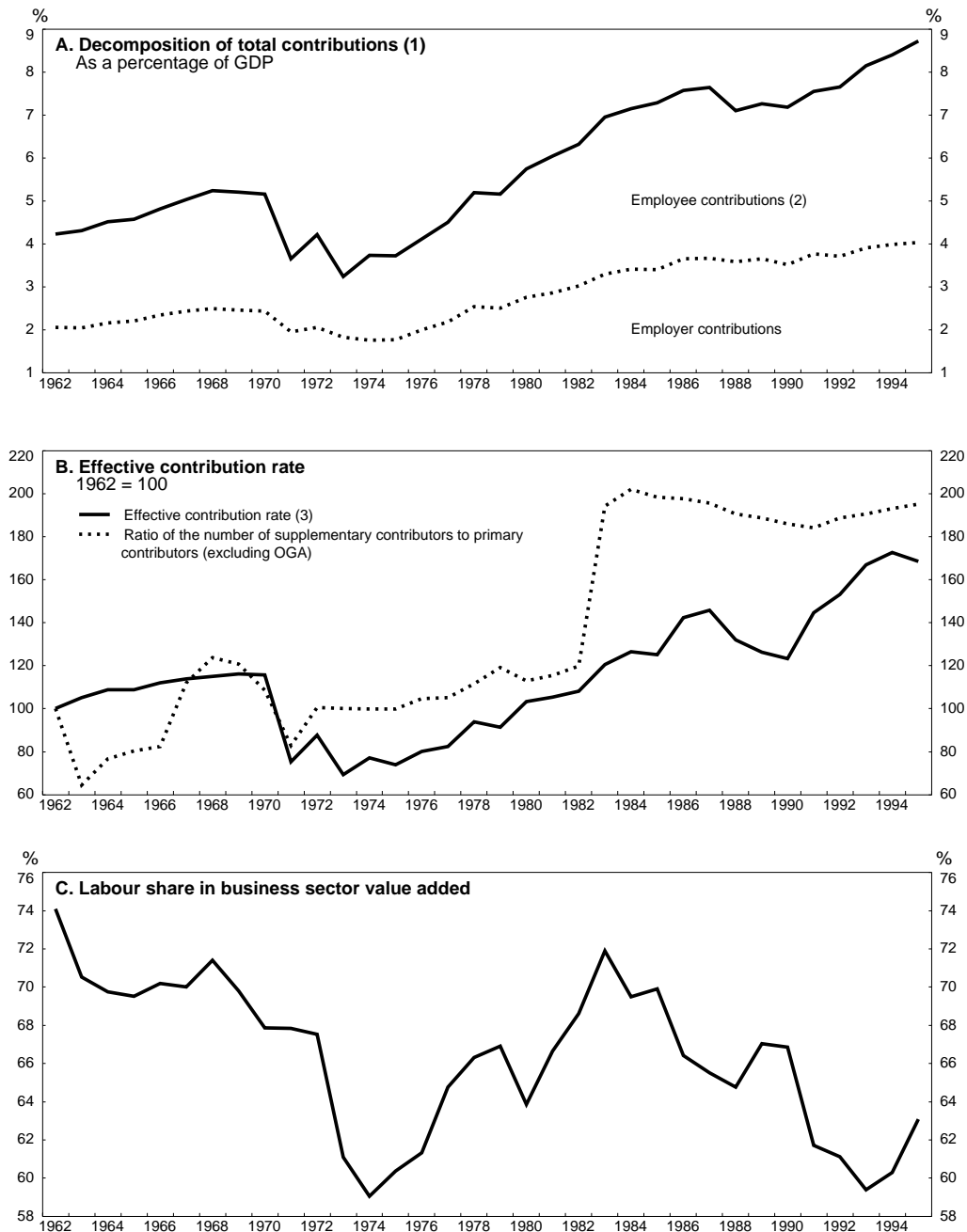Source: OECD.

Figure A1. EXPENDITURE ON PENSIONS

A. Components of total pension expenditure
As a percentage of GDP

Primary

Separation and other

Supplementary

B. Transfer ratio and supplementary pensions
1962 = 100

— Transfer ratio (Average pension / average earnings)
····· Ratio of the number of supplementary pensions to basic pensions (including OGA)

C. Decomposition of beneficiary ratio
1962 = 100

— Dependency ratio (population over 65 to population 15-64)
····· Eligibility ratio (pensions to population over 65)
- - Inactivity ratio (population 15-64 to total employment)

Source: Social Security Budgets.

Figure A2. NEW IKA PENSIONERS BELOW AGE 60

Source: IKA.

Figure A3. CONTRIBUTIONS FOR PENSIONS

A. Decomposition of total contributions (1)
As a percentage of GDP

Employee contributions (2)

Employer contributions

B. Effective contribution rate
1962 = 100

Effective contribution rate (3)

Ratio of the number of supplementary contributors to primary contributors (excluding OGA)

C. Labour share in business sector value added

1. Including contributions for health care which amount to 2 per cent of GDP in 1994, excludes government contributions and transfers.
2. Includes total of self-employed contributions.
3. Contributions divided by total compensation.
Source: Social Security budgets.

Figure A4. PENSION EXPENDITURE AND RECEIPTS
As a percentage of GDP
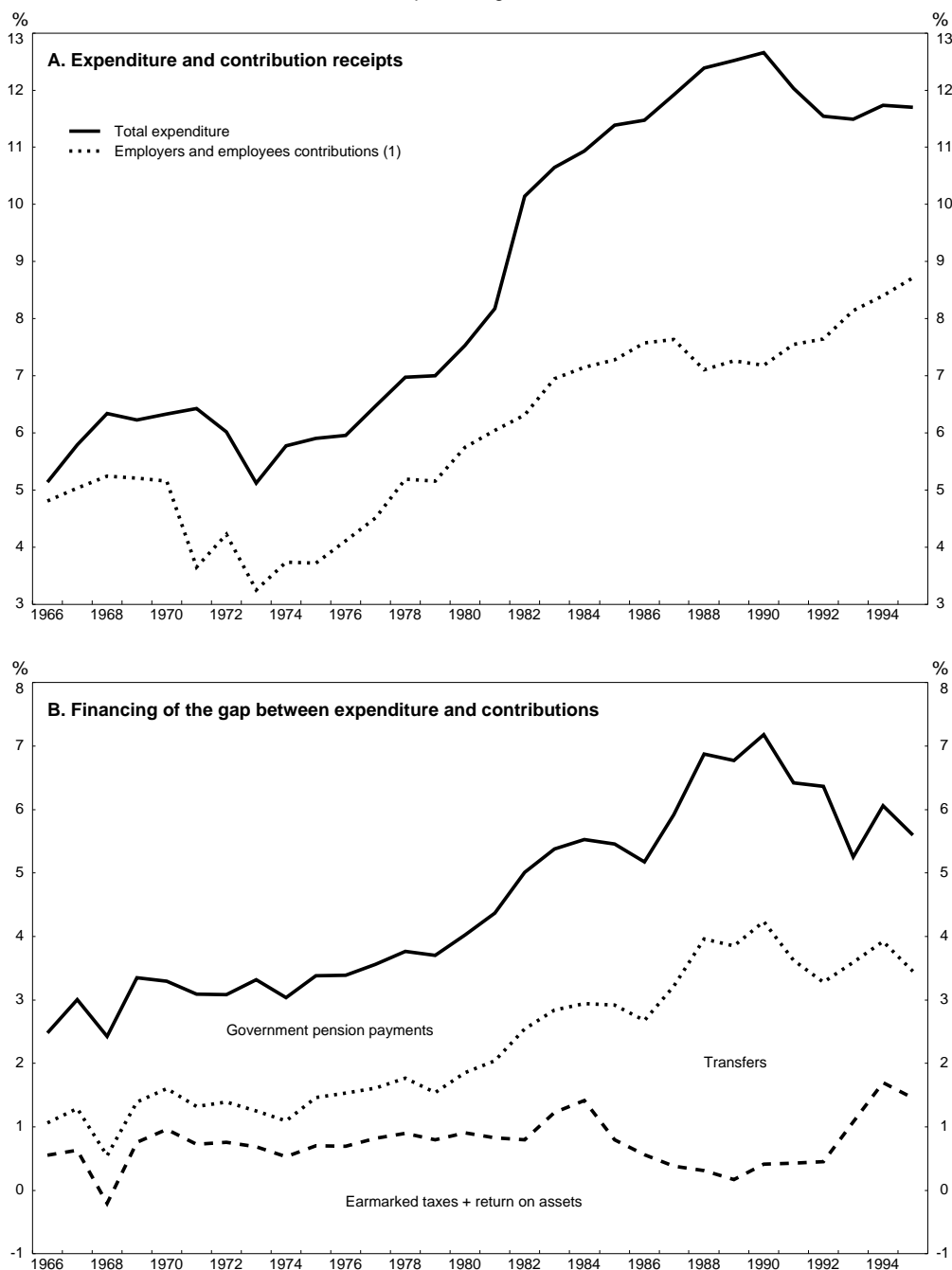
1. Including total contributions for health care which amount to 2 per cent of GDP in 1994.
Source: Social Security budget.

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