

ECONOMIC PAPERS

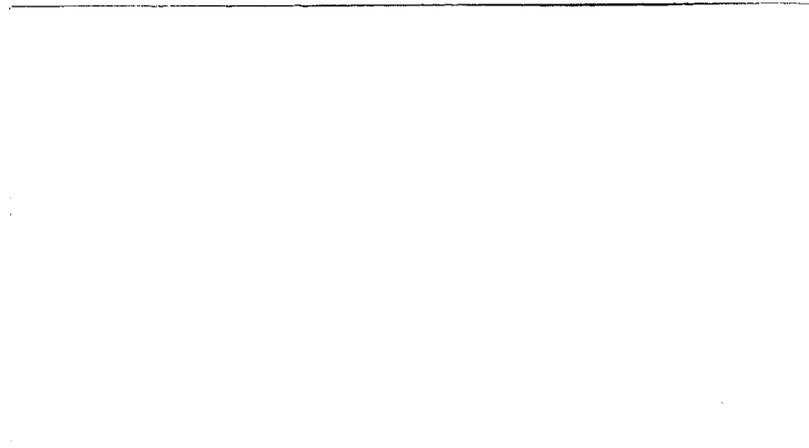
EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR ECONOMIC AND FINANCIAL AFFAIRS

Number 110 May 1995
Pension Liabilities -
Their Use and Misuse in the Assessment
of Fiscal Policies
Daniele Franco*



"Economic Papers" are written by the Staff of the Directorate-General for Economic and Financial Affairs, or by experts working in association with them. The "Papers" are intended to increase awareness of the technical work being done by the staff and to seek comments and suggestions for further analyses. Views expressed represent exclusively the positions of the author and do not necessarily correspond to those of the European Commission. Comments and enquiries should be addressed to the:

European Commission
Directorate-General for Economic and Financial Affairs
200, rue de la Loi
1049 Brussels, Belgium



CORRIGENDUM

ECONOMIC PAPERS

Number 110

May 1995

Pension Liabilities – Their Use and Misuse in the Assessment of Fiscal Policies

Daniele Franco*

- * The author is currently Economic Advisor in the Directorate-General for Economic and Financial Affairs of the European Commission.

ECONOMIC PAPERS

Number 110

May 1995

Pension Liabilities – Their Use and Misuse in the Assessment of Fiscal Policies

Daniele Franco*

* The author is currently Economic Advisor in the Directorate-General for Economic and Financial Affairs of the European Commission.

CORRIGENDUM

ECONOMIC PAPERS

Number 110

May 1995

Pension Liabilities – Their Use and Misuse in the Assessment of Fiscal Policies

Daniele Franco*

- * The author is currently Economic Advisor in the Directorate-General for Economic and Financial Affairs of the European Commission.

b) Current workers' and pensioners' liabilities

These represent the sum of the present value of accrued rights of workers and pensioners, plus the present value of the rights acquired in the future by present workers, minus the present value of future contributions of present workers (CW).

While there is no change in LP, LW becomes

$$LW_t = \sum_{s=1}^2 \sum_{j=20}^{100} M_{j,s} B_{j,s} \sum_{i=t}^{t+80} Q_{i,j,s} S_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where $B_{j,s}$ represents the average pension paid at retirement to workers of sex s and age j in year t computed on the basis of full working life.

The present value of future contributions of present workers (assuming nobody retires after 70) is equal to

$$CW_t = \sum_{s=1}^2 \sum_{j=20}^{70} M_{j,s} C \sum_{i=t}^{t+80} R_{i,j,s} Y_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where C is the contributory rate on labour income

$R_{i,j,s}$ represents the probability of working in year i for workers of sex s and age j in year t

$Y_{i,j,s}$ represents the labour income in year i of workers of sex s and age j in year t .

Denoting with superscript "b" this definition of liabilities:

$$L^b = LP^a + LPS^a + LPC^a + LW^b + LWS^b + LWI^b - CW^b$$

c) Open-system liabilities

These include the present value of accrued and future rights of present workers and pensioners, the present value of future contributions of present workers and the present value of contributions (CWN) and pension (LWN) of new workers. The latter can be defined in many ways.

In case only children living at year t are considered:

$$LWN_t = \sum_{s=1}^2 \sum_{j=1}^{19} T_{j,s} B_{j,s} \sum_{i=t}^{100} V_{i,j,s} S_{i,j,s} ((1+p)/(1+r))^{i-t}$$

**Pension Liabilities --
Their Use and Misuse in the Assessment of Fiscal Policies**

Contents

1. Introduction
2. Definitions
3. The Scale of the Pension Liabilities
4. The Relevance of Accrued Liabilities
5. The Relevance of New Net Liabilities
6. Pension Liabilities and Fiscal Policy Assessment

References

Annex: The Valuation of Pension Liabilities

1. Introduction

In recent years a number of studies have estimated the liabilities of public pay-as-you-go (PAYG) pension schemes¹ and have argued that these liabilities should be taken into account when evaluating the state and the perspectives of public finances.² It has been shown that in most countries the "pension-debt" is much greater than the conventional public debt and that "the inclusion of the capitalized net pension liabilities in a wider definition of debt would ... change the assessment of relative debt positions of different countries."³ It has been claimed that "the strains that higher dependency ratios will impose on budget policies can be seen by examining the present value of future net liabilities of the pension systems in the major industrial countries."⁴

These estimates and suggestions are closely related to several theoretical studies that have pointed to the deficiencies of conventional cash-flow deficit measures in the assessment of fiscal impact and of budgetary sustainability. As to the former matter, it has been claimed that "conventional deficit measures are likely to be deficient indicators of fiscal impact except under extreme assumptions regarding private sector behaviour -- for example, myopia regarding the future implications of current government policy or liquidity constraints."⁵ As to sustainability, it has been suggested that, "by relying on conventional accounting methods, budgetary authorities may not be provided with the means to adequately monitor and control the government's overall fiscal position."⁶

In order to overcome these difficulties it has often been prescribed to resort to "economic deficit" or to "government net worth."⁷ Both these solutions would require the inclusion of pensions in fiscal accounts when obligations are incurred rather than when the actual expenditure is made.⁸ In order to evaluate economic deficit, contributions to PAYG schemes would have to be classified as a financing item, while pensions would be considered as a loan repayment or as an interest payment. Any change in the present value of pension liabilities would immediately influence government net worth.

¹ For the seven major western countries see Van den Noord and Herd (1993 and 1994), for European Union countries Kuné, Petit and Pinxt (1993), for Japan, Germany, Sweden and the United States see Hagemann and Nicoletti (1989), for the UK Hills (1984), for Italy Castellino (1985), Beltrametti (1993) and Rostagno (1995). Some papers providing estimates for Argentina, Chile, China, Colombia and Turkey are indicated in World Bank (1994). The papers by Van den Noord and Herd and by Hagemann and Nicoletti were prepared within OECD.

² See Van den Noord and Herd (1993), IMF (1993), Hoffmann (1993) and Castellino (1985).

³ Van den Noord and Herd (1993, p. 31).

⁴ IMF (1993, p. 56). The IMF refers to the estimates presented in the paper by Van den Noord and Herd.

⁵ Towe (1991, p. 116).

⁶ Towe (1991, p. 110)

⁷ See, respectively, Kotlikoff (1984) and Buiter (1983). For a critique see Mackenzie (1989). For a survey see Towe (1991) and Blejer - Cheasty (1991).

⁸ The same methodology would be applied to all "contingent liabilities". A contingent liability can be defined as a public sector action that determines a cash expenditure only if and when a certain event takes place.

Despite this theoretical and empirical work, budgetary policy is still usually defined and evaluated in terms of conventional deficit and debt measures.⁹ Public pension schemes liabilities are usually ignored. For instance, there is no provision for them in the Convergence criteria for European Monetary Union.¹⁰ This means that, at least in theory, a country could adhere to the Union while accumulating pension liabilities that might endanger its public finance balance in the future.

This paper reviews the literature concerning pension liabilities in order to assess their potential role in the evaluation of budgetary policy. It addresses chiefly the matter of budgetary sustainability.¹¹

Section 2 examines the main definitions of pension liabilities (see Annex): a) accrued-to-date liabilities, b) present pensioners' and workers' liabilities, and c) open-system liabilities (i.e., liabilities inclusive of the present value of benefits and contributions of new workers). Section 3 reviews some recent studies providing internationally comparable data concerning the scale of pension-debt; it also compares their results with those of some national estimates. Sections 4 and 5 address the economic relevance of, respectively, accrued and future liabilities. Section 6 focuses on the issue of the use of pension liabilities in the assessment of fiscal policy.

The main conclusions of the paper are the following.

- a) There are practical and theoretical reasons for not including pension liabilities in the deficit and the debt measures that are used in defining and evaluating current fiscal policy. The same arguments should apply to Convergence criteria.
- b) Estimates of pension liabilities may nevertheless represent a useful complement to conventional debt and deficit measures. They bring a clearer understanding of fiscal impact on consumption and saving ratios, and of some aspects of the economic situation of PAYG schemes.
- c) Neither accrued-to-date liabilities nor discounted future liabilities represent an indicator of the sustainability of pension policy and of PAYG pension schemes' present or future pressure on the budgets.
- d) Accrued-to-date liabilities are useful for the measurement of economic deficits; the estimates available for some countries show that in the last few decades economic

⁹ With some exceptions represented by New Zealand new Crown Financial Statements and by the introduction of a chapter on Generational accounting in the U.S. Budget (Office of Management and Budget, 1994).

¹⁰ Public pension schemes liabilities, as a part of the more general problem of budgetary policy sustainability, may enter in the Convergence criteria indirectly, through Article 104c(3). This article requires that in preparing the report concerning the Member States not fulfilling the debt and deficit criteria, the Commission should take into account government investment expenditure and "all other relevant factors, including the medium term economic and budgetary position of the Member State".

¹¹ As to the definition of sustainability see Blanchard et al. (1990). The effects of pension liabilities on fiscal impact have been examined by the extensive economic literature concerning the effect of "social security wealth".

deficits have been much larger than conventional cash flow deficits. Accrued-to-date liabilities also provide a measure of the cost of terminating PAYG pension schemes; their present size shows that in many countries any large scale shift from PAYG to funded schemes would be extremely burdensome for the generation of workers involved.

- e) Present pensioners' and workers' liabilities, which correspond to Social Security Wealth, are relevant for the assessment of fiscal effects on saving decisions.
- f) Open-system liabilities, which include new net expected pension rights, provide a measure of the difference between the implicit return on contributions to PAYG schemes and some rate of return assumed as a benchmark. Estimates of new net rights do not provide any measure of present and future cash imbalances, nor do they provide information on the need to adjust contribution rates or benefit rules, or on pressures on the budget.
- g) The medium-term perspectives of pension systems, and the pressure of pension schemes on the budgets, might be examined with indicators that are more relevant, simpler and more transparent than pension liabilities. The expenditure to GDP ratio and the contribution rate which assures the cash balance of the pension scheme would be appropriate. The benefit return on the contributions to PAYG schemes should also be computed and compared with the sum of the rates of growth of average wage and employment.
- h) Although pension schemes are likely to exert the greatest strain on western countries' budgets in the next few decades, budgetary sustainability should be assessed more precisely and comprehensively with an accounting framework that considers all budgetary items. This approach would also avoid some methodological difficulties encountered in defining the future revenues of pension schemes. The economic effects of ageing might also be examined with general equilibrium models, taking the interaction of households, producers, and government behaviour into account.
- i) Internationally comparable indicators of pension liabilities should be developed along the lines indicated in recent studies on the matter. Although international studies have been very useful in promoting an interest in pension liabilities, their estimates are not satisfactory. They differ greatly from those of more analytic national studies. The amount of information required to estimate pension liabilities is such that it can be properly assessed only with the support of national experts.

2. Definitions

Any pay-as-you-go pension scheme¹² gives rise to unfunded liabilities. Within these schemes each generation provides the resources for paying the pensions of older workers

¹² It is "a pension finance arrangement whereby current liabilities are met from current contributions, and no fund is accumulated in advance to meet future needs" (Dilnot et al. 1994, p. 212).

and later receives pensions financed by younger workers.¹³ Therefore, at any point in time there exists a number of retired citizens who are entitled to a pension for the remaining part of their life (and sometimes also of the life of their widowed spouse) and a number of working citizens who can claim a right to a pension in the near or distant future. The debt arises with the creation of the PAYG pension scheme, when a generation of elderly citizens receives a pension without having paid any previous contribution¹⁴.

It should be stressed that there is nothing inherently negative in the existence of unfunded pension liabilities. The matter should be judged in terms of the efficiency of PAYG schemes¹⁵ and their role in achieving society's equity objectives.

There exist three main definitions of pension liabilities¹⁶.

- a) **Accrued-to-date liabilities:** these represent the present value of pensions to be paid in the future on the basis of accrued rights; neither the future contributions of existing workers, nor the accrual of new rights by them are considered.
- b) **Current workers and pensioners' liabilities:** in this case it is assumed that pension schemes continue their "existence until the last contributor dies, while no new entrants are allowed"¹⁷; both the future contributions of existing members and their new rights are therefore allowed for under current rules¹⁸.
- c) **Open-system liabilities:** these also include the present value of contributions and pensions of new workers under current rules; the range of options extends from including only children not yet in the labour force, to an infinite perspective.

The methodology for estimating pension liabilities according to the three different definitions is examined in the Annex. Clearly, estimates require a large amount of detailed information about the distribution of workers and pensioners as to age, sex, wage and contributory periods. It is also clear that the results depend on several hypotheses concerning mortality rates, activity rates, wage and price trends. The discount rate of future contributions and benefits is also very important. Estimates should obviously take into account the specific pension rules of each country. Within each country, specific estimates should be produced for each pension scheme, in case pension schemes have different rules.

¹³ In some countries public PAYG schemes provide pensions to all citizens. In these cases one should more properly refer to "younger citizens" and to "older citizens".

¹⁴ In some cases elder citizens had paid contributions to a funded scheme gone bankrupt. This is what happened in Germany and Italy after the Second World War, when the previous funded schemes collapsed because of the war and high inflation.

¹⁵ See, for instance, Diamond (1977) and Barr (1992).

¹⁶ See Castellino (1985).

¹⁷ Van den Noord - Herd (1993).

¹⁸ This definition corresponds to the concept of "net social security wealth" developed by Feldstein (1974) and frequently referred to in the debate concerning the effects of social security on saving decisions.

Definitions b) and c) require an assessment of the expected value of future contributions. In the case of public pension schemes this may raise a complex methodological problem. In some countries current pensions are fully financed by specific contributions to pension schemes. Future contributions can thus be assessed on the basis of present contribution rates. In most countries current pensions are also financed from other sources, such as general tax revenues and borrowing. In this case, if future contributions are assessed on the basis of the contribution rate to pension schemes, there is a tendency to overestimate liabilities. The overestimation would be particularly large for the countries relying mostly on general taxation. If, on the other hand, the relevant contributory ratio is assumed to be equal to the pension-expenditure ratio in the base year, there is a tendency to underestimate the imbalances of countries relying on borrowing.

It would be better to try to assess future contributions on the basis of the present contributory rate to pension schemes plus present recourse to general taxation. In other words, present recourse to borrowing should be excluded from estimates of future contributions. This method would also involve some arbitrary assumption.

Two more aspects are relevant in defining pension liabilities:

- i) in countries where pensions are included in the personal income tax base, liabilities should be net of the presumed taxes levied on them;¹⁹ this requires an estimate of the average tax rate on pensions; it has to be considered that even assuming the stability of the present rate structure in real terms,²⁰ the average tax rate on pensions is likely to change over time since the ratio of pension to other income may change;
- ii) in countries where public pension schemes are fully or partially funded, liabilities should be computed net of pension fund assets.

3. The scale of the pension liabilities

Tables 1 and 2 contain the estimates of pension liabilities provided in 1989 by Hagemann and Nicoletti, in 1993 by Van den Noord and Herd, and again in 1993 by Kuné et al. The first and the second works were prepared within the OECD, the third within ABP.²¹ In the tables and in this section, they will be referred to respectively as OECD (1989), OECD (1993) and ABP (1993). The first work refers to pension scheme accounts in 1985; the others refer to 1990 accounts. The countries considered do not coincide. Only Germany is examined in all three papers. Before examining the data, however, it is necessary to consider some methodological issues.

The studies are based on a highly simplified version of the methodology presented in the Annex. In OECD (1993), for each country a "full pension" (which is actually an average

¹⁹ No such adjustment is necessary for conventional public debt, since no tax is levied on public bonds when they are refunded.

²⁰ Tax rates are adjusted to income changes in order to keep the tax to income ratio constant.

²¹ ABP (Algemeen Burgerlijk Pensioenfonds) is the pension fund of the Dutch public employees. The paper was prepared for CEPS Working Party on "Financing Retirement Provision in Europe".

Table 1: Public Pension Liabilities: Present value of accrued rights
(per cent of 1990 GDP)

Country	OECD (1993) *						ABP (1993)		
	Gross Liabilities			Existing assets	Net liabilities	Gross liabilities			
	Retired	Workforce	Total			Civil Servants	Non Civil Servants	Total	
Belgium						30	38	68	
Denmark						0	69	69	
Germany (w)	54	103	157	-	157	50	72	122	
Greece						16	102	118	
Spain						13	96	109	
France	77	139	216	-	216	31	38	69	
Ireland						8	46	54	
Italy**	94 (94)	148 (165)	242 (259)	-	242 (259)	29	78	107	
Luxembourg						25	113	138	
Netherlands						0	137	137	
Portugal						16	80	96	
U K	58	81	139	-	139	0	42	42	
USA	42	70	113	23	89				
Japan	51	112	163	18	144				
Canada	42	71	113	8	105				

* Data for Canada and the UK have been updated as in Van den Noord-Herd (1994).

** Figures in brackets- estimates of liabilities before the 1992 pension reform.

Table 2: **Public Pension Liabilities: Present value of future pension entitlements (per cent of 1990 GDP)**

Country	OECD (1989)*	OECD (1993) **					ABP (1993)		
	Total net rights in period 1985-2060	Accrued rights	New net rights of present workforce	Net rights of children not yet in the workforce	Net rights of unborn generations	Total	Accrued rights	New gross rights of existing citizens	Total
Belgium							68	44	112
Denmark							69	28	97
Germany (w)	355	157	-8	-2	13	160	122	57	179
Greece							118	78	196
Spain							109	74	183
France		216	-16	-7	23	216	69	37	106
Ireland							54	49	103
Italy***		242 (259)	-60 (-22)	-36 (-11)	-45 (8)	101 (223)	107	77	184
Luxembourg							138	99	237
Netherlands							137	73	210
Portugal							96	71	167
U K		139	-23	-12	-3	100	42	28	70
USA	158	112	-21	-14	-11	66			
Japan	217	163	10	8	38	218			
Canada		105	16	14	57	191			

* Percent of 1985 GDP. Swedish liabilities are estimated as 183 or 228 percent of GDP according to pension indexation to prices or to wages.

** Data for Canada and the UK have been updated as in Van den Noord-Herd (1994).

*** Figures in brackets - estimates of liabilities before the 1992 pension reform.

pension) is computed dividing total public expenditure on pensions by the number of pensioners. The present value of current pensions is estimated on the basis of the full pension, of mortality rates, and of a discount rate. Pensions are supposed to be held constant in real terms.

In estimating the pension rights of current workers, OECD (1993) assumes that in each country the standard retirement age is 60, and the number of years of contributions required for a full pension²² is 40. It also assumes that pension entitlements accrue at a constant rate of 1/8 of the full pension every five contribution years. Present workers are grouped in eight five-year brackets. The members of each bracket are assumed to be entitled to the same pension rights. During working life, pension entitlements are projected to grow at the same rate as projected real earnings and real output per worker. This means that the ratio of the average new pension to real earnings per worker is held constant. An exception is made for Canada and the United Kingdom "where pension rates undergo a structural upgrading."²³

ABP (1993) follows broadly the same lines. Standard retirement age is nevertheless assumed to be 65, and no structural upgrading is considered. In OECD (1993) the different PAYG schemes existing in each country are considered as a single "average" system; in the ABP paper the present value of pension rights is estimated separately for public sector and private sector workers.

In OECD (1993) the discount rate is 4 per cent in real terms in the period 1990-2010; after that, it gradually declines reaching 3 per cent in 2050. An alternative projection with a discount rate 1.5 per cent higher than in the baseline is also presented. In OECD (1989) the discount rate is set at 2 per cent for Germany, Sweden and the US and at 3.5 per cent for Japan. The ABP's discount rate is 4 per cent for the whole projection period.

In all the papers some assumptions are clearly unsatisfactory.

- a) In many countries younger pensioners, who obviously live longer, receive, on average, higher pensions than older ones. The assumption that pension level is uniform tends to underestimate the present value of current pensioners' rights. Besides, the use of the current average pension as the term of reference for the level of future pensions may lead to erroneous estimates. Estimates may turn out too low if pension levels undergo a structural upgrading, and too high if rules concerning the level of new pensions have been tightened.
- b) In some countries (like Germany and Italy up to 1992) pensions are also indexed to real wage increases. Holding pensions constant in real terms determines an underestimate of liabilities.²⁴

²² That is for a pension equal to the 1990 average pension.

²³ Structural upgrading may depend on younger generations of citizens retiring with longer contributory periods or with more favourable rules concerning the determination of the pension paid.

²⁴ Van den Noord and Herd (1994) provide an estimate of the pension liabilities of the seven major western countries under the assumption that all pension benefits after retirement are indexed to earnings. Accrued pension liabilities are 10 to 20 per cent higher than in the case of price indexation.

- c) OECD (1989) and OECD (1993) do not provide separate estimates for public and private sector workers. This may lead to some underestimation of liabilities since in many countries in the last decades public employment has grown faster than total employment, and public employees usually have better retirement rules.
- d) The APB paper does not take into account that some pension systems may not yet have reached maturity (i.e., that the ratio of average new pensions to average earnings may increase over time); OECD (1989) considers structural upgrading for Japan and Sweden; OECD (1993) considers it for Canada and the UK.²⁵

Table 1 contains the estimates of accrued pension liabilities according to OECD (1993) and ABP (1993). The data concerning the four major EU Member States show that estimates vary considerably: UK's liability ranges between 42 and 139 per cent of GDP, France's between 69 and 216. OECD provides the highest estimates and ABP the lowest. The ranking of the four countries changes: Germany comes first according to ABP, third according to OECD.

In OECD's estimates, pensioners' rights represent 30 to 40 per cent of total rights. In ABP's estimates, civil servants' rights represent 40 per cent of total pension rights in Belgium, Germany, and France. It is a much higher percentage than their incidence in the labour force. This supports the view that pension liabilities ought to be estimated separately for all the major schemes with different rules existing in any country.

Table 2 shows some estimates of pension liabilities according to definitions b) and c) (as listed in Section 2). It should be noted that ABP estimates do not take into account the future flow of contributions to PAYG schemes. This tends to overestimate pension liabilities. OECD (1993) assumes that in five of the seven countries considered, contributions to PAYG schemes are going to be equal, with respect to GDP, to the incidence of their expenditure on GDP in 1990.²⁶ This means that no part of 1990 public budget deficits is attributed to public pension schemes. There follows an underestimation of future liabilities of pension schemes. For the two remaining countries contributions are computed at present rates. The latter methodology is also applied by OECD (1989).²⁷

OECD (1993) provides an account with estimates regarding a) present workers, b) children not yet in the workforce, and c) unborn citizens. According to the paper: "A positive number in such an account implies a net debt of the government to a specific generation, and hence a net transfer of wealth to that generation. Similarly, a negative number represents a net debt of a particular generation to the government and hence a

²⁵ As regards Italy, for instance, only one third of the increase in the ratio of public pension expenditure to GDP between 1960 and 1990 may be attributed to demographic changes (Franco, 1993). The increase in the pension to GDP ratio that was forecast before the 1992 pension reform was also largely attributed to the maturation of pension schemes.

²⁶ The countries are Canada, France, Germany, Italy and the United Kingdom.

²⁷ As to the US, legislated future increases contribution rates are taken into account.

net transfer of wealth to that generation."²⁸This interpretation of the data will be examined in Section 5.

According to these estimates, in Canada and Japan rights for new generations are accruing faster than contributions. Some adjustment to contribution rates or benefit rules would therefore be necessary in order to avoid new transfers of resources to pensioners. In France and Germany "accruals of contributions would broadly match new accruals of pension rights (while leaving the existing accruals unfinanced)."²⁹ In Italy, the United Kingdom and the United States future generations have already "been called to transfer wealth to current generations." This does not imply that in the latter countries there is scope for improving benefits or for cutting contribution rates.

OECD (1989) provides an estimate of the unfunded pension liabilities of all individuals aged 17 to 90 years in 1985. Its results should be comparable with the sum of OECD (1993) accrued rights and new net rights of the present workforce. Again, the estimates differ very much: 355 per cent of GDP in OECD (1989) as against 149 per cent in OECD (1993) for Germany, 158 per cent as against 91 per cent for the USA, 217 per cent as against 173 per cent for Japan. A part of the difference surely depends on the assumptions about the discount rate. In the case of Germany it may also depend on the different methodologies used in estimating future contributions.

The different solutions adopted by OECD (1993) and ABP (1993) for evaluating future contributions also explain the different results in Table 1 and Table 2. As already mentioned in Section 2, both solutions are rather unsatisfactory.

Table 3 contains some data on the assets of public pension schemes and on tax claims on private pensions. Tax claims on public pensions are usually assumed to be 20 per cent of these pensions³⁰. Altogether in the Netherlands, the UK, the USA and Japan, these corrective factors range from one third to two thirds of GDP.

Table 4 reports the results of some estimates of pension liabilities carried out at national level in more analytical terms. UK and Italian estimates are rather larger than those presented in Tables 1 and 2.³¹ In the case of Italy there is a huge difference in the estimates of liabilities existing before the 1992 pension reform and in the estimates of the effects of the reform. OECD (1993) results concerning Italy, which also contrast with those of other studies concerning the perspectives of the Italian pension system³²,

²⁸ OECD (1993, p. 54).

²⁹ But this would not matter as long as the PAYG systems were not terminated.

³⁰ Bovemberg - Petersen (1992), Hofmann (1993).

³¹ The gross liabilities of Italian pension schemes have been estimated also in Pench (1993), which discounts the flow of expected pension expenditure up to the year 2025. The paper aims at evaluating the permanent (seignorage-adjusted) primary surplus excluding pensions required to insure fiscal policy sustainability; for that reason it does not deduct future contributions from future expenditure.

³² INPS (1993), Ragioneria Generale dello Stato (1994), Castellino (1994).

Table 4 Public pension liabilities: national studies

Country	Author	Year	Definition	Liabilities/ GDP	In Year
Italy	Castellino	1985	L ^a	317	1983
			L ^b	153	1961
	Beltrametti	1993		303	1971
				317	1981
			368	1991	
USA	Beltrametti	1994	L ^b	389 (1)	1992
			L ^b	278 (2)	1992
	Feldstein	1974	L ^b	71	1960
				111	1970
UK	Bohn	1992	L ^a	50-90(3) + 27 (4)	1989
			L ^a	198/214	1982

(1) Before 1992 pension reform

(2) After 1992 pension reform

(3) Social Security

(4) Civil Service and Military

L^a Accrued to date liabilities

L^b Current workers' and pensioners' liabilities.

depend largely on the overestimation of future contribution and on the underestimation of benefits arising from the assumption considered above.

National studies show that in some countries the ratio of pension liabilities to GDP has grown considerably during the last decades; accordingly, in these countries, economic deficits have been much larger than conventional cash flow deficits. The inclusion of the change in liabilities in deficit statistics would have increased the Italian deficit by 11 points of GDP every year between 1971 and 1981 and by 5 points every year between 1981 and 1991.

4. The relevance of accrued liabilities

Among the three definitions of pension liabilities, that of Accrued-to-date liabilities is the only one which can be assimilated to conventional public debt. It can be argued that "from the worker's point of view, social security 'tax' contributions are, in most respects, equivalent to the purchase of a government liability."³³ To support this view it can be claimed that an abrupt end to or a radical change in a PAYG scheme would impose large adjustment costs and personal hardships to pensioners and workers who have taken their savings and labour supply decisions on the basis of the existence of the scheme.³⁴

Nevertheless, accrued pension rights differ in many ways from conventional public debt.³⁵

- a) While the timing of the repayment of public bonds as well as the amount to be paid to the holders are fixed in advance, those of pension liabilities are uncertain.³⁶ They depend on decisions made by the holders of the entitlements (concerning, for instance, the age of retirement, where some flexibility is allowed) and on various types of events (those concerning the length of life, wage and price dynamics, etc.).³⁷
- b) Pension rights are not embodied in formal contracts. The debtor can modify both the timing and the amount of the payment. While failure to repay financial liabilities may give rise to legal claims and political reactions, the repudiation of PAYG pension liabilities may raise only the latter.³⁸ In some circumstances workers and pensioners

³³ Kotlikoff (1984, p. 567).

³⁴ According to Bohn (1992, p. 4), "One should distinguish between a social-security system in its start-up phase, where the first generation of participants receive substantial 'unearned' benefits, and a more mature system. Since promises to make gift are generally unenforceable, the benefits promised in the start-up phase cannot be considered government liabilities. On the other hand, it is difficult to imagine that a government could cancel the social-security benefits of retirees who have made social security contributions throughout their life." This distinction, although appealing, is not easily applied.

³⁵ The subject is extensively examined in Rizzo (1985). See also Pedone (1987) and Bohn (1992).

³⁶ For a general analysis of government contingent liabilities see Towe (1991).

³⁷ The elasticity of pensions to price and wage changes is frequently different from 1.

³⁸ On the political-economy of support to pension expenditure see Buchanan (1983), Rizzo (1985) and Tabellini (1990).

may accept (or may be unable to avoid) a reduction in their pension rights. The Italian pension reform of 1992 provides a clear case: 30 per cent of the pension-debt was wiped out at a time when public finances were considered to be in a very critical situation.

- c) While public bonds are usually bought freely on the market by individuals or companies, the acquisition of pension rights is usually compulsory. This means that a large pension-debt does not determine any direct pressure on the financial markets.³⁹ It also implies that the debt is automatically renewed.
- d) Pension rights are not tradable. This implies that changes in the relative yield and the relative risk of pension rights comparatively to other assets have no effect on financial markets. It also implies less protection for pension-right holders than for bond holders. Bohn (1992, p. 45) notes that: "For government debt, any attempt to default -- outright or through inflation -- would imply undesirable market disruptions. Such 'protection' against default does not exist for social-security claims. In addition, non tradability implies that social-security claims could be altered selectively, taking individual characteristics (e.g., income, demographics) into account."

The special treatment accorded to future pension expenditure may also be disputed. To some extent, all spending programmes create implicit contracts containing future liabilities. Penner (1982, p. 234) notes that: "One might argue that the degree of political commitment to future pensions is somewhat stronger than to other entitlements in that pension benefits seem much harder to cut than other entitlements. But neither are cut very often, and this is admittedly a weak argument." Brittan (1993) takes a more radical view: "The fallacy of such estimates (of pension liabilities) is to treat pension commitments differently from other forms of public spending. The pay-as-you-go schemes, from which the scare stories stem, are based on each generation of workers paying through taxes and contributions sufficient to cover the cost of pensions for those already retired. Thus, pensions are, like any other form of rising public expenditure, to be met from higher tax revenue or social security contributions, or reduced spending elsewhere."

The ratio of accrued pension liabilities to GDP is not even a measure of pension schemes sustainability or, more generally, of public finance sustainability. A high debt to GDP ratio does not necessarily imply an imbalance in the PAYG pension schemes or in the budget. Nor does it imply that an imbalance will occur in the future. Consider the following case (henceforth case A).

Assume that there is a society with four citizens: one is 10 years old, one is 30, one is 50, and one is 70. The second and the third citizens work; their gross income is 100 ECU each. The oldest citizen is retired; his pension is 40 ECU. Suppose GDP is equal to the sum of workers' product (200 ECU). The contributory rate on workers' income, which corresponds to the ratio of pension expenditure on GDP, is 20 per cent. Assume that incomes and pensions grow at a constant rate and that this rate is equal to the interest

³⁹ A large future pension expenditure may obviously influence the attitude towards public bonds, but this is an indirect effect.

rate.⁴⁰ Also assume that every citizen works from 20 to 60, that pensions accrue at a constant rate during working years (with a present value of 1 ECU per year), that everyone lives 80 years. The retired citizen accrued rights amount at 400 ECU (40 ECU times 10 years of expected life); the two workers' accrued rights amount to 800 ECU (10 ECU times 20 years of expected life in retirement for the first worker + 30 ECU times 20 years for the second worker). Altogether pension liabilities amount to 6 times GDP. The contributory rate is set to remain stable at 20 per cent.

Now, suppose that (let's call this case B), all things being equal, there are three workers aged 50 (the 'baby boom' generation). Pension liabilities and GDP are, respectively, 2400 and 400 ECU (since there are now four workers); the ratio between the two is, like in case A, equal to 6. Pension expenditure is presently 10 per cent of GDP, but in 10 years' time it will rise to 60 per cent and become unsustainable.⁴¹

This example makes it clear that any judgement about the sustainability of pension schemes requires estimates about the resources available to pay for the accrued pensions, namely about the evolution of employment and per capita income. Accrued-to-date liabilities do not include such estimates. All one can say is that the larger the ratio of pension rights to GDP, the higher the share of future public resources committed to pension expenditure and the higher the risk that, if GDP growth is not adequate, some adjustment will become necessary (in terms of higher tax rates, of repudiation of pension rights, etc.)

Accrued-to-date liabilities are nevertheless relevant in two respects.

- i) Changes in the level of accrued rights in real terms signal that there is a divergence between the cash deficit and the accrual deficit. If citizens perceive these changes as changes in their assets, they may alter their consumption and savings behaviour. Estimates of accrued rights may therefore be relevant in the evaluation of the impact of fiscal policy. This topic has been extensively examined in many works concerning the so-called Social Security Wealth.⁴²
- ii) The levels of accrued rights measure the cost of closing down a PAYG scheme when fully complying with present rules concerning benefits.⁴³ If there is a switch from a PAYG system to a funded system, and all new contributions are paid into the new system, accrued rights measure the amount of resources which have to be financed out of general taxation. According to Van den Noord and Herd (1993)

⁴⁰ In many countries pensions are indexed to price dynamics. Therefore, the assumption that relates them to wage dynamics tends to overestimate pension expenditure. On the other hand, in many countries there are rules that work the opposite way. For instance, pensions are frequently based on the wages earned in the latter part of working life, which are often higher than the average real wage earned during the whole life.

⁴¹ If the discount rate were assumed to be higher than the rate of growth of wages, in case B the pension-debt to GDP ratio would be lower than in case A. Case B would even appear less worrying than case A.

⁴² As already noted, Social Security Wealth is usually defined in terms of present workers' and present pensioners' rights (see Rossi and Visco, 1994). Data presented in Table 2 make it clear, nevertheless, that accrued rights represent most of these rights.

⁴³ See World Bank (1994).

estimates, in order to switch to full funding in 30 years (without increasing budget deficits), the tax to GDP ratio ought to be increased by about 5 points in Germany and the UK, by 7 points in France and by 8 points in Italy.⁴⁴

This aspect of pension liabilities is stressed by Buchanan (1983, p. 349), who notes that the huge costs of closing the US Social Security system explain why the system is supported by individuals who "recognize that their investment of tax payments in the system are much less advantageous than their opportunities for investment in the market." According to Buchanan (p. 353), since the government is not likely to default on the pension debt, the only way out of the PAYG system is the issue of new conventional debt "intended to insure that all future generations, along with the present one, share equally in the costs imposed by the mistakes of almost half a century." This is surely a straightforward solution. Whether it is feasible and desirable, is another matter.⁴⁵ Points b), c), and d) suggest that the pension debt may be more manageable than the conventional debt. It can also be argued that, if pension benefits are linked to contributions, the latter are likely to be less distortionary than other taxes.⁴⁶ It would therefore be preferable to levy contributions earmarked to pension schemes than to resort to general taxation to finance the interest expenditure on the new conventional bonds.

5. The relevance of new net liabilities

Present pensioners' and workers' liabilities and Open-system liabilities include pension rights that are yet to accrue. Strictly speaking, these pension rights should not even be called liabilities, but potential liabilities. They cannot therefore be in any way assimilated to conventional public debt, which is a backward looking statistic.

New expected rights may have, instead, a role in the assessment of the perspectives of pension schemes. For this purpose it is necessary to net new expected pension rights of the expected contributions that will be paid to pension schemes. The evaluation of future contributions involves the methodological problem considered in Section 3.

New net pension rights can be estimated for different "generations" of born and unborn citizens. These estimates are obviously relevant in the assessment of the role of the public sector in the distribution of resources among different generations. The data reported in

⁴⁴ In order to understand these estimates, it may be helpful to reconsider the case of the four citizens' economy outlined above (with accrued liabilities equal to 600 per cent of GDP). In this economy, in order to switch to full funding in 30 years the workers should provide additional resources equal to 20 per cent of GDP. In the first 10 years these revenues would pay for the pensions of the present 70 year old citizen; in the following 20 years they would pay for the pension of the 50 year old citizen and set up a fund equivalent to the pension rights of the 30 year old citizen.

⁴⁵ During the eighties, when Chile switched from PAYG to a funded pension system, the creation of new conventional debt was limited by the large budget surplus build up by the government and by sales of public enterprises. The 'recognition bonds' that were paid to the workers that decided to switch to the new system as a compensation for their accumulated entitlements were not transferable or redeemable before their retirement. See Diamond (1993) and World Bank (1994).

⁴⁶ See also Bohn's (1992, p. 45) arguments on the relationship between the smaller distortionary effects of contributions linked to social-security benefits and the risk of default on the pension-debt.

Table 2 make it clear that the return on the contribution paid may vary considerably for the different generations of citizens.

Future rights are positive when the discounted flow of benefits is higher than the discounted flow of contributions; they are negative when the former flow is smaller than the latter. But what is the economic meaning of positive and negative net future rights? Do they actually imply that there is a net payment by the government to a particular generation or that, conversely, there is a net payment by a particular generation to the government? Do they say anything about pressure on the budget stemming from PAYG schemes? Or about the sustainability of pension policy?

Let us first begin with the following identity, that simply states that in a "pure" PAYG system in any period of time the total amount of contributions must be equal to the total amount of pensions:

$$c w N_l = p N_p$$

Where c is the contribution rate levied on wages
 w is the average wage
 N_l represents the number of workers
 p is the average pension
 N_p represents the number of pensioners.

Suppose each citizen works in the first half of his/her life and gets a pension in the following half. In period 1:

$$C^1 = c w^1 N_l^1 \quad \text{and} \quad p^1 = c w^1 N_l^1 / N_p^1$$

Where C is the total amount of contributions. In period 2:

$$C^2 = c w^2 N_l^2 = c w^1 N_l^1 (1 + w^*) (1 + n_l^*) \quad \text{and}$$

$$p^2 = c w^2 N_l^2 / N_p^2 = c w^1 N_l^1 (1 + w^*) (1 + n_l^*) / N_l^1$$

Where w^* is the rate of growth of wages
 n_l^* is the rate of growth of workers

The rate of return on the contributions paid to the PAYG scheme (let's call it rc) is therefore:

$$rc = p^2 / c w^1 - 1 = w^* + n_l^* + w^* n_l^*$$

If c is constant over time; w , N_l and N_p dynamics are exogenous; and p is adjusted in each period of time in order to balance expenditures with revenues, the rate of return on contributions is approximately equal to the sum of the rates of growth of per capita wages and of the number of workers.⁴⁷

⁴⁷ See Aaron 1966).

In this case, if $rc = w^* + \eta_1^* > r$ (the discount rate), net future rights are positive. As long as $w^* + \eta_1^* > r$,⁴⁸ by enrolling in a PAYG scheme, each generation gets a net payment that it would not have received had it enrolled in a funded scheme investing at a rate equal to r .⁴⁹ In this specific situation, positive rights do not imply any net payment by the government to a particular generation, or any need to adjust contribution rates, or any pressure on the budget. More generally, a PAYG pension policy is sustainable, in the sense that it does not require any change in rules, as long as $rc = w^* + \eta_1^*$.

Let's come back to the assessment of pension liabilities. In this case, the rules concerning p are held constant over time. This means that, even if the amount of contributions is equal to that of pensions in period 1, this need not happen in period 2. In other words, rc is no longer necessarily equal to $w^* + \eta_1^*$. In this case, net pension rights are still positive if the implicit return on contribution is greater than the return rate assumed as a benchmark (i.e., if $rc > r$), but the sign of net pension rights does not convey any information on whether or not there is an imbalance in the PAYG scheme. It provides no information on whether $rc > w^* + \eta_1^*$ or $rc < w^* + \eta_1^*$, which is the relevant aspect in assessing the need to modify pension policy.

The sign and the dimension of pension rights obviously depend on the choice of r , which, as the survey carried out in Section 3 has shown, is rather arbitrary. If r is very high, even a scheme where rc is much higher than $w^* + \eta_1^*$ would show negative net rights. Conversely, if r is very low, even a scheme where rc is much lower than $w^* + \eta_1^*$ would show positive net rights.

In conclusion, positive net rights do not imply that the pension system is presently unbalanced in cash terms or that it will become unbalanced within a certain time.⁵⁰ Neither do they imply that some adjustment will have to take place in the future. On the other hand, there may exist circumstances in which even with null or negative new expected rights the pension system can exert large cash pressure on the budget. It may be useful to refer again to cases A and B introduced in Section 4. In both cases, the expected new net rights are null since each worker is supposed to pay 20 per cent of his income for 40 years in order to get 40 per cent of his income for 20 years.⁵¹ Nevertheless, in case A there is no need for adjustment, while in case B the retirement of the three 50 year old citizens requires a major adjustment in contribution rates, or in benefits, or in budgetary transfers.

It would be more relevant to provide estimates of rc and to compare them with present and future values of $w^* + \eta_1^*$. Unless one assumes that a certain rate of return on

⁴⁸ Although this condition (which gives rise to the so-called "social insurance paradox") is not necessarily efficient in a steady state situation (see Felderer 1993 and the papers he quotes), past experience has shown that it may occur for long periods of time (see, for instance, for Italy Gronchi et al. 1994).

⁴⁹ Obviously, as Aaron (1966, p. 374) notes: "If saving and, hence, investment and, hence, the rate of growth of income are reduced as the level of social insurance increases, this conclusion does not necessarily follow." But this is another matter.

⁵⁰ This point is also made in Consiglio tecnico-scientifico della programmazione (1994).

⁵¹ Remember that wage and pension growth rates are supposed to be equal to the interest rate.

contributions represents a normative benchmark for the assessment of PAYG schemes, any comparison between rc and an arbitrary r does not lead very far.

Had estimates of new net rights been carried out in the sixties and the seventies, they would have probably shown large positive values. Two factors would have contributed to that result: rc was in many countries higher than it is now; the value chosen for r would have probably been lower than those chosen in the more recent papers examined in Section 3. Despite their limited economic relevance, the large positive values would have implicitly signaled that citizens were granted very high returns on contributions, and that these returns were unlikely to be continuously matched by a high level of $w^*+n_1^*$. The availability and the diffusion of estimates might have limited the tendency to improve pension benefits and might have accelerated the reform of pension schemes. Recent estimates, that take the reforms of the eighties and the nineties into account, are apparently less worrying. Van den Noord and Herd (1993) record negative or nearly null new net rights in four out of the seven countries that they consider. In spite of that, due to the decline in $w^*+n_1^*$, the situation of pension systems is very worrying: a declining number of new workers is being called to service a large accrued debt.

In a way, estimates of future net rights were not available when they were mostly needed. Now that they are available, it is apparent that in many countries the problem does not lie in avoiding that future net rights have positive values, but in cutting accrued rights and in getting new generations of workers to accept negative net rights.

6. Pension liabilities and fiscal policy assessment

The inclusion of pension liabilities in the public debt definition would require an analogous change in the deficit definition. Contributions would become loans to the public sector; pensions would be considered, in part, as loan repayment and in part as an implicit interest payment.⁵² In this accounting system, an increase in contribution rates, all things being equal, would have no effect on current deficit, while it would reduce future deficit (since interest payments would be lower). Any increase in the benefits promised for the future would increase current deficit and leave future ones unchanged.

There are practical as well as theoretical reasons for avoiding the inclusion of pension liabilities in the deficit and debt statistics that are used in defining current fiscal policies.⁵³

- a) The conventional public debt can be measured rather precisely and unambiguously at any point in time. Pension liabilities are uncertain and depend on the specific hypothesis adopted upon a variety of factors, such as life expectancy, price and

⁵² This solution is supported in Kotlikoff (1984). Towe (1991, p. 117) notes that "proponents of this system do not address the issue of decomposing benefit payments into 'principal' and 'interest'. Presumably, actuarial criteria could be applied."

⁵³ Brittan (1993) takes a very radical view on the matter: "According to an ancient sage there are three kinds of human ills: those inflicted by providence, those inflicted by our fellow men and women, and those we inflict on ourselves. The scare campaign to increase the size of estimated government debt by adding in unfunded public sector pension liabilities belongs to this last category."

wage trends, etc. Present value calculations are extremely sensitive to changes in assumptions. As Boskin et al. (1987, p. 45) point out, referring to the U.S.A.: "Moving all of the economic and demographic projections from intermediate to either optimistic or pessimistic (assumptions) results in a change which is larger than the privately held national debt." The effects on deficit estimates would even be relatively larger. This means that, as Blejer and Cheasty (1991, p. 1675) point out at the end of their survey concerning the literature on net worth concepts of the deficit, "net worth measures could be dangerous if used for near-term fiscal policy."

- b) As mentioned in Section 4, pension rights are acquired compulsorily and are not tradable. They produce no direct effect on financial markets. The inclusion of pension liabilities in the debt and deficit measures would obscure the pressure of the public sector on financial markets. The case of Italy may again be relevant. Despite the fact that the 1992 reform wiped out pension liabilities equal to Italian conventional debt, the role of the public sector in the financial markets have not changed significantly.
- c) As it was pointed out in Section 4, pension liabilities cannot be fully assimilated to conventional liabilities. The most relevant difference regards the fact that pension liabilities can be reduced by changing benefit rules: major pension reforms have reduced the future entitlements of current workers and pensioners. Indexation mechanisms, retirement ages, eligibility rules and other aspects of the pension system have been frequently modified in recent years in Western countries. Consequently it would be erroneous to assume that pension programs represent a firm legal or moral commitment.⁵⁴
- d) Another reason for not including pension liabilities in public debt definition concerns the negative effect that this action might have on pension reforms. As it is put forward by Boskin (1982): "I would not wish to have the current rules and regulations of the social insurance program cemented into a unified capital account of the government as if we had issued explicit long-term contractual debt obligations, that is, I do not want to enshrine pay-as-you-go financing of these programs and government activities at current projected levels".
- e) Although pension liabilities surely affect consumption and saving decisions⁵⁵, the magnitude of the impact is not necessarily equal to that of public financial liabilities. Pension rights holders may have limited foresight, may not trust present or future government's capacity to deliver the full pensions they are entitled to under present rules, may be cash-constrained, may live in a world with imperfect capital markets.

⁵⁴ One should nevertheless consider that the implementation of large cuts in pension rights may obviously raise political reactions, and that these reactions are likely to increase with the gradual shift of political power towards the older generations. As Börsh-Supan (1991, pp. 129-130) notes: "In West Germany after 2020 the majority of the voters will be pensioners and workers who will become retired within the next 10 years. We then risk facing a typical free-rider situation as the older generation can outvote the younger generation in determining their retirement income as well as the rate of social security taxes the younger generation has to pay".

⁵⁵ As to savings, see for instance Rossi and Visco (1994) who suggest that the growth of PAYG schemes' liabilities contributed substantially to the decline in Italian saving ratio between the sixties and the eighties.

The inclusion of pension rights in debt and deficit statistics on a one-to-one basis might, therefore, lead to an erroneous estimate of the impact of fiscal policy.⁵⁶

- f) The addition of pension liabilities to the conventional public debt would produce misleading indications of the effects of changes in interest rates on public expenditure perspectives and budgetary sustainability. Since accrued pension liabilities are negatively related to the level of the interest rate, any increase in this level would automatically reduce total debt. This apparent improvement might correspond to an actual worsening of budgetary conditions due to the increase in interest expenditure.

The inclusion of pension liabilities in debt and deficit statistics would obviously also influence international comparisons of public finance data. The amount of the total public debt would depend on the structure of the pension system. More specifically, the countries relying on PAYG schemes would record a higher debt than those relying on funding. Since pension liabilities are usually larger than conventional debt, there would be major effects in the debt ranking of different countries.

In evaluating the new ranking one would have to keep in mind the previous points a), b), and c): the sensitivity to assumptions, the power of governments to reduce pension rights, and the lack of direct effects on financial markets. Furthermore, one would have to consider that neither theory nor past experience support the view that the recourse to PAYG schemes rather than to funded schemes necessarily implies a less sound public finance and a less efficient economy.⁵⁷

Estimates of pension liabilities may, nevertheless, represent a useful complement to conventional debt and deficit measures. As has been shown in the two previous paragraphs, they bring a clearer understanding of fiscal impact on consumption and saving ratios, of deficits in accrual terms, and of the economic balance of pension schemes. Furthermore:

- a) they would highlight the future cost of present pension policies;
- b) they would reduce the incentive "for fiscal authorities to substitute away from cash to noncash activities as a means of circumventing constraints on the overall cash-based deficit or expenditure".⁵⁸

As it has been pointed out in the previous sections, the evaluation of pension liabilities requires detailed information on national pension systems. This information is probably available only at national level. International organisations might play an important role in defining uniform methodologies with the aim of achieving internationally comparable estimates and contributing to a better control of budgetary policies at country level.

⁵⁶ This point is extensively examined in Mackenzie (1989).

⁵⁷ The PAYG versus funding argument is very complex and is beyond the scope of this paper. See, for instance, the papers in OECD (1992) and Sartor (1993).

⁵⁸ Towe (1991, p. 126).

It should be already clear that, despite their intuitive appeal, estimates of pension-debt cannot provide any answer to the following questions: a) "Can the current course of fiscal policy be sustained, without exploding -- or imploding -- debt? Or will the government have to increase taxes, decrease public spending, have recourse to monetisation, or even repudiation?"⁵⁹; b) what effects will the changes in the demographic structure, namely the ageing process, exert on Western countries public finance in the future?; c) what pressure will PAYG pension schemes exert on the budgets?

Other indicators should be used. Budgetary sustainability should be assessed more precisely and comprehensively with an accounting framework that considers all budgetary items.⁶⁰ This approach would also avoid some methodological difficulties encountered in defining the future revenues of pension schemes.

Although pension schemes are likely to exert the greatest strains on western countries' budgets in the next few decades, a wider approach would also be useful in the assessment of the effects of ageing. Demographic changes will actually influence most expenditure items⁶¹: population ageing will increase health care expenditure since the consumption of services raises steeply with age; it will also increase the demand for some social services; the decline in the number of young people will provide an opportunity to reduce education expenditure; the decline in total population growth, and in some countries the decline of total population, might reduce the requirements for capital expenditure.

Short- and medium-term demographic effects might be assessed estimating the evolution of the ratio to GDP of the different expenditure items under the assumption of unchanged policies. Long term effects might be examined with general equilibrium models taking the interaction of households, producers, and government behavior into account.⁶²

The short- and medium-term perspectives of PAYG pension systems might be examined with indicators that are simpler and more transparent than pension liabilities. The expenditure to GDP ratio and the contribution rate that assure the cash balance of the pension scheme would be appropriate.

⁵⁹ Blanchard (1990).

⁶⁰ See Auerbach et al. (1991) and Kotlikoff (1992).

⁶¹ See, for instance, OECD (1988) and Pearson et al. (1989).

⁶² See, for instance, Auerbach et al. (1989).

References

Aaron H. (1966), "The social insurance paradox", Canadian Journal of Economics and Political Sciences, XXXII, No. 3, pp. 371-374.

Auerbach A. J. - Gokhale J. - Kotlikoff L. J. (1991), "Generational Accounts: A Meaningfull Alternative to Deficit Accounting", in Bradford D. (ed.), Tax Policy and the Economy, Cambridge, MA, NBER, Vol. V.

Auerbach A. J. - Kotlikoff L. J. - Hagemann R. P. - Nicoletti G. (1989), "The Economic Dynamics of an Ageing Population: The Case of Four OECD Countries", OECD Department of Economics and Statistics Working Paper, No. 62.

Barr N. (1992), "Economics Theory and the Welfare State: A Survey and Interpretation", Journal of Economic Literature, Vol. XXX, June.

Beltrametti L. (1993), "Una stima della ricchezza pensionistica per l'Italia (1951-1991)", Rivista Internazionale di scienze sociali, n. 1, pp. 3 - 15.

Beltrametti L. (1994), "Su alcuni effetti redistributivi della riforma del sistema previdenziale", in Rossi N. (ed.), Una transizione equa, 1992-1993. Secondo rapporto CNEL sulla distribuzione e redistribuzione del reddito in Italia, Il Mulino, Bologna.

Blanchard O. (1990), "Suggestions for a New Set of Fiscal Indicators", OECD Department of Economics and Statistics Working Papers, No. 79.

Blanchard O. - Chouraqui J-C. - Hagemann R. P. - Sartor N. (1990), "The Sustainability of Fiscal Policy: New Answers to an Old Question", Economic Studies, OECD, No. 15, Autumn, pp. 7-36.

Blejer M. J. - Cheasty A. (1991), "The Measurement of Fiscal Deficits: Analytical and Methodological Issues", Journal of Economic Literature, Vol. XXIX, December, pp. 1644-1678.

Bohn H. (1992), "Budget deficits and government accounting", Carnegie-Rochester Conference Series on Public Policy, Vol. 37, pp. 1-84.

Börsch-Supan A. (1991), "Ageing population: problems and policy options in the US and Germany", Economic Policy, April, pp. 104- 139.

Boskin M. J. (1982), "Federal Government Deficits: Some Myths and Realities", American Economic Review, Paper and Proceedings, May, pp. 296 - 303.

Bovenberg L. - Petersen C. (1992), "Public Debt and Pension Policy", Fiscal Studies, vol. 13, No. 3, pp. 1-14.

Brittan S. (1993), "The harmful myth of hidden state debt", Financial Times, December 13th.

Buchanan J. M. (1983), "Social Security Survival: A Public-Choice Perspective", Cato Journal, Vol. 3, No. 2, pp.339-353.

Buiter W. (1983), "Measurement of the Public Sector Deficit and Its implication for Policy Evaluation and Design", IMF Staff Papers, 30 (2), pp. 306 - 349.

Castellino O. (1985), "C'è un secondo debito pubblico (più grande del primo)?", Moneta e credito, n. 149.

Castellino O. (1994), Suggerimenti per una riforma del sistema previdenziale italiano ovvero il rapporto che non fu scritto, mimeo.

Consiglio tecnico-scientifico della programmazione (1994), Parere sulla questione del debito pubblico previdenziale, Ministero del Bilancio, Roma.

Diamond P. (1977), "A framework for social security analysis", Journal of Public Economics, No. 8.

Diamond P. (1983), "Privatization of Social Security: Lessons from Chile", NBER Working Paper Series, No. 4510.

Dilnot A. - Disney R. - Johnson P. - Whitehouse E. (1994), Pension Policy in the UK - An Economic Analysis, The Institute for Fiscal Studies.

Felderer B. (1993), "New Issues in Public Pension Economics", Journal of Economics, Suppl. 7, pp. 1-15.

Feldstein M. (1974), "Social Security, Induced Retirement, and Aggregate Capital Accumulation", Journal of Political Economy, September-October.

Franco D. (1993), L'espansione della spesa pubblica in Italia (1960-1990), Il Mulino, Bologna.

Gronchi S. - Nastrucci A. - Alessandrini A. - Sidoti A. - Taliano G. (1994), "I rendimenti impliciti della previdenza obbligatoria: un'analisi delle iniquità del sistema", Conti pubblici e congiuntura economica, Ministero del Tesoro, N. 2, pp. 131-161.

International Monetary Fund (1993), World Economic Outlook, October, Washington.

Hagemann R. P. - Nicoletti G. (1989), "Ageing Populations: Economic Effects and Implications for Public Finance", OECD Department of Economics and Statistics Working Paper, No. 61.

Hills J. (1984), "What is the Public Sector Worth?", Fiscal Studies, Vol. 5, No. 1, pp. 18-31.

Hoffman J. (1993), The Remaking of Europe - Employment and the Hidden Debt, CS First Boston.

INPS (1993), Le pensioni domani, Bologna, Il Mulino.

Kotlikoff L. J. (1984), "Economic Impact of Deficit financing", Staff Papers, International Monetary Fund, Vol. 33, pp. 549 - 581.

Kotlikoff L. J. (1992), Generational Accounting -- Knowing Who Pays, and When, for What We Spend, New York, Free Press.

Kuné J. B. - Petit W. F. M. - Pinxt A. J. H. (1993), "The Hidden Liabilities of Basic Pension Systems in the European Community", CEPS Working Document, No. 80, November.

Mackenzie G. A. (1989), "Are All Summary Indicators of the Stance of Fiscal Policy Misleading?", IMF Staff Papers, Vol. 36, No. 4, pp. 743-770.

OECD (1988), Ageing Populations - The Social Policy Implications, Paris.

OECD (1992), Private Pensions and Public Policy, Paris.

Office of Management and Budget (1994), Budget of the United States Government - Analytical Perspectives, pp. 21 - 31, Washington.

Pearson M. - Smith S. - White S. (1989), "Demographic Influences on Public Spending", Fiscal Studies, No. 2, pp. 48-65.

Pedone A. (1987), "Commento a Debito pubblico e politica previdenziale di O. Castellino", in F. Bruni (ed.), Debito pubblico e politica economica in Italia, Editore SIPI, Roma.

Pench L. (1993), "Debt, deficits and fiscal adjustment", in European Commission, The economic and financial situation of Italy, European Economy, Reports and Studies, No. 1.

Penner R. G. (1982), "How much is owed by the Federal Government?", Carnegie-Rochester Conference Series on Public Policy, No. 16, pp. 233-256.

Ragioneria Generale dello Stato (1994), "I rendimenti impliciti della previdenza obbligatoria: una analisi delle iniquità del sistema", Conti pubblici e congiuntura economica, anno IV, No. 2.

Rizzo I. (1985), "Note su una definizione del concetto di debito pubblico", Rivista di diritto finanziario e scienza delle finanze, No. 1, pp. 185-204.

Rossi N. - Visco I. (1994), "Private saving and government deficit in Italy", in Ando A. - Guiso L. - Visco I., Saving and the Accumulation of Wealth, Cambridge University Press.

Rostagno M. (1995), Il debito previdenziale italiano - Il Fondo Pensioni Lavoratori Dipendenti, mimeo.

Sartor N. (1993), "On the Role of Budgetary Policies During Demographic Changes", Supplement to Public Finance -- Finances Publiques, Vol. 48, pp. 217-227.

Tabellini G. (1990), " A Positive Theory of Social Security", CEPR Discussion Paper, No. 394, April.

Towe C. M. (1991), "The budgetary Control and Fiscal Impact of Government Contingent Liabilities", IMF Staff Papers, Vol. 38, No. 1.

Van den Noord P. - Herd R. (1993), "Pension liabilities in the seven major economies", OECD, Economics Department Working Papers, n. 142.

Van den Noord P. - Herd R. (1994), "Estimating pension liabilities: A methodological framework", OECD, Economic Studies, n. 23, Winter, pp. 131-166.

World Bank (1994), Averting the Old Age Crisis, Oxford University Press.

ANNEX: THE VALUATION OF PENSION LIABILITIES

a) Accrued-to-date liabilities

Accrued-to-date liabilities (L) represent the present value of pensions to be paid in the future on the basis of accrued rights.

$$L = LP + LW$$

with LP = Present pensioners' liabilities

LW = Present workers' liabilities.

In principle, for each pensioner of age a one should compute (assuming that nobody lives more than 100 years):

$$LP_a = \sum_{i=a}^{100} B_i S_i / (1+r)^{i-a}$$

here B_i represents his/her pension in year i

S_i represents his/her probability to be alive in year i

r is the discount rate.

By assuming that the pension increases at a constant rate (p), one obtains:

$$LP_a = B_a \sum_{i=a}^{100} S_i ((1+p)/(1+r))^{i-a}$$

where B_a represents his/her present pension.

The total present value of pensions existing in year t (taking into account that disability pensions can be paid also to young workers and assuming that all pensions start and expire at the beginning of each year) is the following:

$$LP_t = \sum_{s=1}^2 \sum_{j=20}^{100} N_{j,s} B_{j,s} \sum_{i=t}^{t+80} S_{j,i,s} ((1+p)/(1+r))^{i-t}$$

where s is the sex of the pensioners

$N_{j,s}$ is the number of pensions paid to pensioners of sex s and age j in year t

$B_{j,s}$ represents the average pension paid to pensioners of sex s and age j in year t

$S_{j,i,s}$ represents the probability to be alive in year i for pensioners of sex s and age j in year t.

One should also take into account the present value of the survivor pensions that might be paid after the pensioners' death (LPS) and the present value of present survivor pensions paid to children (that usually expire when the recipients reach a certain age - LPC).

Along the same lines, for each worker of age b :

$$LW_b = Q B_w \sum_{i=w}^{100} S_i (1+p)/(1+r)^{j-a}$$

where w represents the expected retirement age

Q represents the probability of receiving a pension

B_w the expected pension at retirement computed on the basis of the contributions already paid to the pension scheme.

The total present value of pensions accrued by present workers (assuming there are no workers under 20 works) is:

$$LW_t = \sum_{s=1}^2 \sum_{j=20}^{100} M_{j,s} B_{j,s} \sum_{i=t}^{t+80} Q_{i,j,s} S_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where s is the sex of the pensioners

$M_{j,s}$ is the number of workers of sex s and age j in year t

$B_{j,s}$ represents the average pension paid at retirement to workers of sex s and age j in year t computed on the basis of the contributions already paid to the pension scheme

$Q_{i,j,s}$ represents the probability of receiving a pension in year t for workers of sex s and age j in year t

$S_{j,i,s}$ represents the probability to be alive in year i for workers of sex s and age j in year t

Since the worker might die, leaving a wife or children entitled to a survivor's pension, or might become disabled, the expected values of both survivors (LWS) and disability pensions (LWI) should also be considered.

Altogether, denoting with a superscript "a" this first definition of pension liabilities:

$$L^a = LP^a + LPS^a + LPC^a + LW^a + LWS^a + LWI^a$$

It has to be noted that these estimates should be carried out for each pension scheme existing in a country, since pension schemes usually have different rules and different compositions of workers and pensioners (as to age, sex, wage, contributory periods, etc.)

b) Current workers' and pensioners' liabilities

These represent the sum of the present value of accrued rights of workers and pensioners, plus the present value of the rights acquired in the future by present workers, minus the present value of future contributions of present workers (CW).

While there is no change in LP, LW becomes

$$LW_t = \sum_{s=1}^2 \sum_{j=20}^{100} M_{j,s} B_{j,s} \sum_{i=t}^{t+80} Q_{i,j,s} S_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where $B_{j,s}$ represents the average pension paid at retirement to workers of sex s and age j in year t computed on the basis of full working life.

The present value of future contributions of present workers (assuming nobody retires after 70) is equal to

$$CW_t = \sum_{s=1}^2 \sum_{j=20}^{70} M_{j,s} C \sum_{i=t}^{t+80} R_{i,j,s} Y_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where C is the contributory rate on labour income

$R_{i,j,s}$ represents the probability of working in year i for workers of sex s and age j in year t

$Y_{j,i,s}$ represents the labour income in year i of workers of sex s and age j in year t .

Denoting with superscript "b" this definition of liabilities:

$$L^b = LP^a + LPS^a + LPC^a + LW^b + LWS^b + LWI^b - CW^b$$

c) Open-system liabilities

These include the present value of accrued and future rights of present workers and pensioners, the present value of future contributions of present workers and the present value of contributions (CWN) and pension (LWN) of new workers. The latter can be defined in many ways.

In case only children living at year t are considered:

$$LWN_t = \sum_{s=1}^2 \sum_{j=1}^{19} T_{j,s} B_{j,s} \sum_{i=t}^{100} V_{i,j,s} S_{i,j,s} ((1+p)/(1+r))^{i-t}$$

where $T_{i,s}$ is the number of children of sex s and age j in year t
 $V_{i,j,s}$ represents the probability of receiving a pension in year i for children of sex s and age j in year t

The expected value of survivor (LWSN) and disability (LWIN) pensions of new workers should also be estimated.

$$CWN_t = \sum_{s=1}^2 \sum_{j=1}^{19} T_{j,s} C \sum_{i=t}^{t+100} K_{i,j,s} Y_{i,j,s} (1+p)/(1+r)^{i-t}$$

$K_{i,j,s}$ represents the probability working in year t for children of sex s and age j in year t .

Denoting with superscript "c" this definition of liabilities:

$$L^c = LP^a + LPS^a + LPC^a + LW^b + LWS^b + LWI^b - CW^b + LWN^c + LWSN^c + LWIN^c - CWN^c$$

Economic Papers

The following papers have been issued. Copies may be obtained by applying to the address mentioned on the inside front cover.

- No. 1 EEC–DG II inflationary expectations. Survey based inflationary expectations for the EEC countries, by F. Papadia and V. Basano (May 1981).
- No. 3 A review of the informal Economy in the European Community, By Adrian Smith (July 1981).
- No. 4 Problems of interdependence in a multipolar world, by Tommaso Padoa–Schioppa (August 1981).
- No. 5 European Dimensions in the Adjustment Problems, by Michael Emerson (August 1981).
- No. 6 The bilateral trade linkages of the Eurolink Model : An analysis of foreign trade and competitiveness, by P. Ranuzzi (January 1982).
- No. 7 United Kingdom, Medium term economic trends and problems, by D. Adams, S. Gillespie, M. Green and H. Wortmann (February 1982).
- No. 8 Où en est la théorie macroéconomique, par E. Malinvaud (juin 1982).
- No. 9 Marginal Employment Subsidies : An Effective Policy to Generate Employment, by Carl Chiarella and Alfred Steinherr (November 1982).
- No. 10 The Great Depression: A Repeat in the 1980s ?, by Alfred Steinherr (November 1982).
- No. 11 Evolution et problèmes structurels de l'économie néerlandaise, par D.C. Breedveld, C. Depoortere, A. Finetti, Dr. J.M.G. Pieters et C. Vanbelle (mars 1983).
- No. 12 Macroeconomic prospects and policies for the European Community, by Giorgio Basevi, Olivier Blanchard, Willem Buiter, Rudiger Dornbusch, and Richard Layard (April 1983).
- No. 13 The supply of output equations in the EC–countries and the use of the survey-based inflationary expectations, by Paul De Grauwe and Mustapha Nabli (May 1983).
- No. 14 Structural trends of financial systems and capital accumulation : France, Germany, Italy, by G. Nardozi (May 1983).
- No. 15 Monetary assets and inflation induced distortions of the national accounts – conceptual issues and correction of sectoral income flows in 5 EEC countries, by Alex Cukierman and Jorgen Mortensen (May 1983).
- No. 16 Federal Republic of Germany. Medium–term economic trends and problems, by F. Allgayer, S. Gillespie, M. Green and H. Wortmann (June 1983).
- No. 17 The employment miracle in the US and stagnation employment in the EC, by M. Wegner (July 1983).
- No. 18 Productive Performance in West German Manufacturing Industry 1970–1980; A Farrell Frontier Characterisation, by D. Todd (August 1983).
- No. 19 Central–Bank Policy and the Financing of Government Budget Deficits : A Cross–Country Comparison, by G. Demopoulos, G. Katsimbris and S. Miller (September 1983).
- No. 20 Monetary assets and inflation induced distortions of the national accounts. The case of Belgium, by Ken Lennan (October 1983).
- No. 21 Actifs financiers et distortions des flux sectoriels dues à l'inflation: le cas de la France, par J.-P. Baché (octobre 1983).
- No. 22 Approche pragmatique pour une politique de plein emploi : les subventions à la création d'emplois, par A. Steinherr et B. Van Haepere (octobre 1983).
- No. 23 Income Distribution and Employment in the European Communities 1960–1982, by A. Steinherr (December 1983).

- No. 24 U.S. Deficits, the dollar and Europe, by O. Blanchard and R. Dornbusch (December 1983).
- No. 25 Monetary Assets and inflation induced distortions of the national accounts. The case of the Federal Republic of Germany, by H. Wittelsberger (January 1984).
- No. 26 Actifs financiers et distorsions des flux sectoriels dues à l'inflation : le cas de l'Italie, par A. Reati (janvier 1984).
- No. 27 Evolution et problèmes structurels de l'économie italienne, par Q. Ciardelli, F. Colasanti et X. Lannes (janvier 1984).
- No. 28 International Co-operation in Macro-economic Policies, by J.E. Meade (February 1984).
- No. 29 The Growth of Public Expenditure in the EEC Countries 1960–1981 : Some Reflections, by Douglas Todd (December 1983).
- No. 30 The integration of EEC qualitative consumer survey results in econometric modelling : an application to the consumption function, by Peter Praet (February 1984).
- No. 31 Report of the CEPS Macroeconomic Policy Group. EUROPE : The case for unsustainable growth, by R. Layard, G. Basevi, O. Blanchard, W. Buiters and R. Dornbusch (April 1984).
- No. 32 Total Factor Productivity Growth and the Productivity Slowdown in the West German Industrial Sector, 1970–1981, by Douglas Todd (April 1984).
- No. 33 An analytical Formulation and Evaluation of the Existing Structure of Legal Reserve Requirements of the Greek Economy : An Uncommon Case, by G. Demopoulos (June 1984).
- No. 34 Factor Productivity Growth in Four EEC Countries, 1960–1981, by Douglas Todd (October 1984).
- No. 35 Rate of profit, business cycles and capital accumulation in U.K. industry, 1959–1981, by Angelo Reati (November 1984).
- No. 36 Report of the CEPS Macroeconomic Policy Group. Employment and Growth in Europe : A Two-Handed Approach by P. Blanchard, R. Dornbusch, J. Drèze, H. Giersch, R. Layard and M. Monti (June 1985).
- No. 37 Schemas for the construction of an "auxiliary econometric model" for the social security system, by A. Coppini and G. Laina (June 1985).
- No. 38 Seasonal and Cyclical Variations in Relationship among Expectations, Plans and Realizations in Business Test Surveys, by H. König and M. Nerlove (July 1985).
- No. 39 Analysis of the stabilisation mechanisms of macroeconomic models : a comparison of the Eurolink models by A. Bucher and V. Rossi (July 1985).
- No. 40 Rate of profit, business cycles and capital accumulation in West German industry, 1960–1981, by A. Reati (July 1985).
- No. 41 Inflation induced redistributions via monetary assets in five European countries : 1974–1982, by A. Cukierman, K. Lennan and F. Papadia (September 1985).
- No. 42 Work Sharing: Why ? How ? How not ..., by Jacques H. Drèze (December 1985).
- No. 43 Toward Understanding Major Fluctuations of the Dollar by P. Armington (January 1986).
- No. 44 Predictive value of firms' manpower expectations and policy implications, by G. Nerb (March 1986).
- No. 45 Le taux de profit et ses composantes dans l'industrie française de 1959 à 1981, par Angelo Reati (Mars 1986).
- No. 46 Forecasting aggregate demand components with opinions surveys in the four main EC-Countries – Experience with the BUSY model, by M. Biart and P. Praet (May 1986).
- No. 47 Report of CEPS Macroeconomic Policy Group : Reducing Unemployment in Europe : The Role of Capital Formation, by F. Modigliani, M. Monti, J. Drèze, H. Giersch and R. Layard (July 1986).
- No. 48 Evolution et problèmes structurels de l'économie française, par X. Lannes, B. Philippe et P. Lenain (août 1986) .
- No. 49 Long run implications of the increase in taxation and public debt for employment and economic growth in Europe by G. Tullio (August 1986).

- No. 50 **Consumers Expectations and Aggregate Personal Savings** by Daniel Weiserbs and Peter Simmons (November 1986).
- No. 51 **Do after tax interest affect private consumption and savings ? Empirical evidence for 8 industrial countries : 1970–1983** by G. Tullio and Fr. Contesso (December 1986).
- No. 52 **Validity and limits of applied exchange rate models : a brief survey of some recent contributions** by G. Tullio (December 1986)
- No. 53 **Monetary and Exchange Rate Policies for International Financial Stability : a Proposal** by Ronald I. McKinnon (November 1986).
- No. 54 **Internal and External Liberalisation for Faster Growth** by Herbert Giersch (February 1987).
- No. 55 **Regulation or Deregulation of the Labour Market : Policy Regimes for the Recruitment and Dismissal of Employees in the Industrialised Countries** by Michael Emerson (June 1987).
- No. 56 **Causes of the development of the private ECU and the behaviour of its interest rates : October 1982 – September 1985** by G. Tullio and Fr. Contesso (July 1987).
- No. 57 **Capital/Labour substitution and its impact on employment** by Fabienne Ilzkovitz (September 1987).
- No. 58 **The Determinants of the German Official Discount Rate and of Liquidity Ratios during the classical goldstandard: 1876–1913** by Andrea Sommariva and Giuseppe Tullio (September 1987).
- No. 59 **Profitability, real interest rates and fiscal crowding out in the OECD area 1960–1985 (An examination of the crowding out hypothesis within a portfolio model)** by Jorgen Mortensen (October 1987).
- No. 60 **The two–handed growth strategy for Europe : Autonomy through flexible cooperation** by J. Drèze, Ch. Wyplosz, Ch. Bean, Fr. Giavazzi and H. Giersch (October 1987).
- No. 61 **Collusive Behaviour, R & D, and European Policy** by Alexis Jacquemin (November 1987).
- No. 62 **Inflation adjusted government budget deficits and their impact on the business cycle : empirical evidence for 8 industrial countries** by G. Tullio (November 1987).
- No. 63 **Monetary Policy Coordination Within the EMS: Is there a Rule ?** by M. Russo and G. Tullio (April 1988).
- No. 64 **Le Découplage de la Finance et de l'Economie – Contribution à l'Evaluation des Enjeux Européens dans la Révolution du Système Financier International** par J.–Y. Haberer (mai 1988).
- No. 65 **The completion of the internal market : results of macroeconomic model simulations** by M. Catinat, E. Donni and A. Italianer (September 1988).
- No. 66 **Europe after the crash : economic policy in an era of adjustment** by Charles Bean (September 1988).
- No. 67 **A Survey of the Economies of Scale** by Cliff Pratten (October 1988).
- No. 68 **Economies of Scale and Intra–Community trade** by Joachim Schwalbach (October 1988).
- No. 69 **Economies of Scale and the Integration of the European Economy : the Case of Italy** by Rodolfo Helg and Pippo Ranci (October 1988).
- No. 70 **The Costs of Non–Europe – An assessment based on a formal Model of Imperfect Competition and Economies of Scale** by A. Smith and A. Venables (October 1988).
- No. 71 **Competition and Innovation** by P.A. Geroski (October 1988).
- No. 72 **Commerce Intra–Branche – Performances des firmes et analyse des échanges commerciaux dans la Communauté européenne** par le Centre d'Etudes Prospectives et d'Informations Internationales de Paris (octobre 1988).
- No. 73 **Partial Equilibrium Calculations of the Impact of Internal Market Barriers in the European Community** by Richard Cawley and Michael Davenport (October 1988).
- No. 74 **The exchange–rate question in Europe** by Francesco Giavazzi (January 1989).

- No. 75 **The QUEST model (Version 1988)** by Peter Bekx, Anne Bucher, Alexander Italianer, Matthias Mors (March 1989).
- No. 76 **Europe's Prospects for the 1990s** by Herbert Giersch (May 1989).
- No. 77 **1992, Hype or Hope : A review** by Alexander Italianer (February 1990).
- No. 78 **European labour markets : a long run view (CEPS Macroeconomic Policy Group 1989 Annual Report)** by J.-P. Danthine, Ch. Bean, P. Bernholz and E. Malinvaud (February 1990).
- No. 79 **Country Studies – The United Kingdom** by Tassos Belessiotis and Ralph Wilkinson (July 1990).
- No. 80 **See "Länderstudien" No. 1**
- No. 81 **Country Studies – The Netherlands** by Filip Keereman, Françoise Moreau and Cyriel Vanbelle (July 1990).
- No. 82 **Country Studies – Belgium** by Johan Baras, Filip Keereman and Françoise Moreau (July 1990).
- No. 83 **Completion of the internal market : An application of Public Choice Theory** by Manfred Teutemann (August 1990).
- No. 84 **Monetary and Fiscal Rules for Public Debt Sustainability** by Marco Buti (September 1990).
- No. 85 **Are we at the beginning of a new long term expansion induced by technological change ?**, by Angelo Reati (August 1991).
- No. 86 **Labour Mobility, Fiscal Solidarity and the Exchange Rate Regime : a Parable of European Union and Cohesion**, by Jorge Braga de Macedo (October 1991).
- No. 87 **The Economics of Policies to Stabilize or Reduce Greenhouse Gas Emissions : the Case of CO₂**, by Mathias Mors (October 1991).
- No. 88 **The Adequacy and Allocation of World Savings**, by Javier Santillán (December 1991).
- No. 89 **Microeconomics of Saving**, by Barbara Kauffmann (December 1991).
- No. 90 **Exchange Rate Policy for Eastern Europe and a Peg to the ECU**, by Michael Davenport (March 1992).
- No. 91 **The German Economy after Unification : Domestic and European Aspects**, by Jürgen Kröger and Manfred Teutemann (April 1992).
- No. 92 **Lessons from Stabilisation Programmes of Central and Eastern European Countries, 1989–91**, by Domenico Mario Nuti (May 1992).
- No. 93 **Post-Soviet Issues : Stabilisation, Trade and Money**, by D. Mario Nuti and Jean Pisani-Ferry (May 1992).
- No. 94 **Regional Integration in Europe** by André Sapir (September 1992).
- No. 95 **Hungary : Towards a Market Economy** (October 1992).
- No. 96 **Budgeting Procedures and Fiscal Performance in the European Communities**, by Jürgen von Hagen (October 1992).
- No. 97 **L'ECU en poche ? Quelques réflexions sur la méthode et le coût du remplacement des monnaies nationales par des pièces et des billets en ECU**, par Ephraïm Marquer (octobre 1992).
- No. 98 **The Role of the Banking Sector in the Process of Privatisation**, by Domenico Mario Nuti (November 1992).
- No. 99 **Towards budget discipline : an economic assessment of the possibilities for reducing national deficits in the run-up to EMU**, by Dr. J. de Haan, Dr. C.G.M. Sterks and Prof. Dr. C.A. de Kam (December 1992).
- No. 100 **EC Enlargement and the EFTA Countries**, by Christopher Sardelis (March 1993).
- No. 101 **Agriculture in the Uruguay Round : ambitions and realities**, by H. Guyomard, L.-P. Mahé, K. Munk and T. Roe (March 1993).
- No. 102 **Targeting a European Monetary Aggregate, Review and Current Issues**, by Christopher Sardelis (July 1993).

- No. 103 **What Have We Learned About the Economic Effects of EC Integration ? – A Survey of the Literature**, by Claudia Ohly (September 1993).
- No. 104 **Measuring the Term Structure of ECU Interest Rates – Johan Verhaeven and Werner Röger** (October 1993).
- No. 105 **Budget Deficit and Interest Rates : Is there a Link ? International evidence**, by José Nunes-Correia and Loukas Stemitsiotis (November 1993).
- No. 106 **The Implications for Firms and Industry of the Adoption of the ECU as the Single Currency in the EC**, by M. Burridge and D.G. Mayes (January 1994).
- No. 107 **What does an economist need to know about the environment ? Approaches to accounting for the environment in statistical informations systems**, by Jan Scherp (May 1994)
- No. 108 **The European Monetary System during the phase of transition to European Monetary Union**, by Dipl.-Vw. Robert Vehrkamp (July 1994).
- No. 109 **Radical innovations and long waves into Pasinetti's model of structural change : output and employment**, by Angelo Reati (March 1995).
- No. 110 **Pension Liabilities – Their Use and Misuse in the Assessment of Fiscal Policies**, by Daniele Franco (May 1995).

Country Studies*

See also Economic Papers No. 79 (The United Kingdom), No. 81 (The Netherlands) and No. 82 (Belgium).

No. 1 The Federal Republic of Germany (September 1990)

No. 2 Portugal (February 1991)

No. 3 United Kingdom (March 1991)

No. 4 Denmark (April 1991)

No. 5 France (août 1991)

No. 6 Ireland (September 1991)

No. 7 Spain (March 1992)

No. 8 Netherlands (June 1992)

No. 9 Greece (July 1992)

No. 10 Luxembourg (March 1993)

* Country studies are the result of internal analysis of the economic situation of the respective member country; they are made on the responsibility of the Directorate-General for Economic and Financial Affairs of the Commission of the European Communities.