
The Value of Pension Entitlements:
A Model of Nine OECD Countries

Edward Whitehouse

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THE VALUE OF PENSION ENTITLEMENTS: A MODEL OF NINE OECD COUNTRIES

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SUMMARY

Pension systems are complex and comparing them across countries is therefore difficult. This paper adopts a standard methodology to calculate prospective pension entitlements in nine countries. The modelling includes universal and resource-tested schemes, public and private earnings-related plans and mandatory defined contribution schemes. The results show gross pension benefits for workers on different levels of earnings and pension benefits net of tax. The paper also provides a detailed description of the parameters of the pension system.

Retirement-income systems are about social protection, but this paper shows that countries interpret this goal very differently. Some focus on ensuring that pensioners have an adequate retirement income (in absolute terms). Others base their systems on ensuring pensioners have an adequate income relative to their pre-retirement income (or 'replacement rate'). In Finland and the Netherlands, for example, mandatory occupational pensions have no ceiling on pensionable earnings, and so all workers get a high replacement rate.

At the other end of the spectrum, Canada and the United Kingdom have low ceilings to pensionable earnings in their public schemes and relatively low accrual rates. Public support for retirement is mainly flat-rate or resource-tested. Other countries lie in between these two groups.

By measuring pensions in a standard way, this paper therefore highlights the differences in philosophy in pension systems, particularly the emphasis on insurance and redistribution.

RESUME

Les systèmes de pensions de retraite sont complexes et procéder à une comparaison des différents pays demeure par conséquent difficile. Ce document suit une méthodologie standard de calcul des droits éventuels de pension de retraite dans neuf pays. Le modèle utilisé inclut des régimes universels et calculés sur les ressources, des plans de pension proportionnels aux salaires (dans le secteur public comme dans le privé), et des régimes de cotisations définis obligatoires. Ce document fournit également une description détaillée des paramètres du système de pension de retraite.

Les systèmes de revenus de retraite concernent la protection sociale, mais ce document montre que les pays interprètent cet objectif différemment. Certains se concentrent sur des revenus de retraite suffisants pour les retraités (en termes absolus). D'autres basent leurs systèmes selon lequel les retraités ont un revenu suffisant relatif à leur revenu de préretraite (ou « taux de substitution »). En Finlande et aux Pays-Bas, par exemple, les pensions de retraite relatives à une activité professionnelle n'ont pas de plafond par rapport aux revenus de pension, et donc tous les travailleurs obtiennent un taux de substitution élevé.

A l'autre bout de l'éventail, le Canada et le Royaume-Uni ont des plafonds de pensions de retraite prévus par leur régime de retraite public qui sont fixés à des taux bas, de même pour les taux de cotisation. Le soutien de l'État aux retraites est principalement à des taux bas fixes et calculés en fonction des ressources. Les autres pays se situent à mi-chemin entre les deux.

En mesurant les pensions de retraite de manière standard, ce document souligne ainsi les différences de philosophies adoptées pour les systèmes de pension de retraite, et plus particulièrement met l'accent sur l'assurance et la redistribution.

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INTRODUCTION

1. The main goal of retirement-income systems is to ensure that the elderly have the resources to support an adequate standard of living. The most common method of measuring countries' success in achieving this objective is to compare directly current pensioners' incomes with general living standards. There are many examples of this 'empirical' approach to looking at the effect of pension systems on the incomes of the elderly, although most form part of broader studies of the distribution of income.¹ While this direct, empirical approach can be very informative, it is silent on a number of important questions. First, it can be an ineffective way of assessing current pension systems. Today's pension outcomes depend as much on past rules of the pension system as they do on the current parameters. These rules have changed significantly over time. Moreover, some schemes have not yet matured and this will affect both levels of current pensioners' incomes and the pattern of incomes with characteristics such as age and marital status. Secondly, current pension outcomes depend on people's earnings, employment and contribution records. Past macroeconomic conditions, again in constant flux, will also have affected pensioners' incomes.

2. This paper adopts a second method, which might be called an 'institutional' approach. It calculates prospective pension entitlements of illustrative workers with particular characteristics. The model used here applies the pension system's parameters — such as accrual rates, minimum pensions, indexation rules, eligibility requirements *etc.* — to calculate pension benefits. The results are typically expressed as replacement rates: the ratio of the pension benefit either to the individual's earnings or to a measure of economy-wide earnings. Unlike empirical studies, therefore, the institutional approach can assess the impact of the rules of the current pension system on current workers.

3. Nevertheless, this institutional approach also has a number of potential problems. First, it assumes that the structure of the pension system and its parameters remain unchanged in the future. But the frequency and the scale of past pension reforms suggest that future pension regimes will look very different from today's systems.² Secondly, it ignores the resources, other than pensions, on which the elderly can draw, such as investments and non-financial wealth, especially housing. A third, related issue is the fact that many of the elderly live in larger households. Individual-level replacement rates ignore the sharing of resources with other household members.

4. For these reasons, empirical analysis of income-distribution data and the forward-looking calculation of pension entitlements should be viewed as complementary parts of the assessment of retirement income systems. The OECD's retirement-income reviews — whose main findings were published in the report *Ageing and Income: Financial Resources and Retirement in Nine OECD Countries*

1 See, for example, Atkinson, Rainwater and Smeeding (1995), Börsch-Supan (1997), Burniaux *at al.* (1998), Disney and Johnson (2001), Disney, Mira d'Ercole and Scherer (1998), Förster and Pellizzari (2000), Hauser (1997) and Johnson (1998). These and other studies are surveyed in Disney and Whitehouse (2001) and Whitehouse (2000c).

2 McHale (1999) studies the impact of reforms on future pension entitlements in the G7 countries. Diamond (1997) argues that pension systems can be excessively responsive to short-term fiscal conditions (given the limited ability of the elderly to absorb these changes).

(OECD, 2001) — adopted such an approach. The results from this paper underlie Chapter 3 of that report³, while Chapter 2 contains new income-distribution data.⁴

5. There have been a number of previous institutional studies that share this paper's aim of calculating pension entitlements for illustrative workers.⁵ Some of these are out of date. Some have ignored private pension benefits or treated them only cursorily.⁶ Some have ignored the effect of direct taxes and looked only at gross pension entitlements. This understates pensioners' relative incomes for a number of reasons.⁷ Pensioners often do not pay social-security contributions. Personal income taxes are progressive: the average tax rate on (lower) pension income will be less than the tax rate on (higher) earned income. In addition, most income tax systems give preferential treatment to pensions (exempting some or all of income from tax) or to pensioners (giving additional allowances, credits or zero-rate bands to the elderly). Replacement rates net of taxes and contributions are higher than gross figures.

6. The following section of the report discusses these countries in turn: Canada, Finland, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States. Each section sets out the key parameters of the pension system, discussing different components separately. These components can include:

- Flat-rate, universal, public benefits, here called basic pensions for short.
- Resource-tested public benefits, where the benefit is withdrawn from richer pensioners. These can be means-tested, where both assets and income are taken into account, purely income-tested or withdrawn only against pension income.
- Earnings-related public benefits (including the so-called 'notional-accounts' based schemes in Italy and Sweden). These schemes pay a higher benefit to people whose earnings were higher during their working lives.
- Employer-provided pensions, which are usually defined benefit (they pay a specific sum or proportion of earnings for each year of membership), called occupational pensions in this report.
- Mandatory personal pensions (which have a defined contribution formula, so the pension benefit depends on contributions made and investment returns earned), known in the United States as 'individual accounts'.

7. As ever, there are many borderline cases. Earnings-related pensions in Finland, the Netherlands and Sweden, for example, are ostensibly privately provided. However, in Finland, these occupational pension schemes are statutory. In the Netherlands and Sweden, collective bargaining has resulted in near universal coverage: these plans are best thought of as 'quasi-mandatory'. In contrast, employers provide occupational schemes voluntarily in Canada, Germany, Japan, the United Kingdom and the United States.

3 Chapter 6 covers the calculations related to voluntary occupational pensions in Canada, the United Kingdom and the United States.

4 Background papers for the income-distribution chapter are Yamada (2001) and Yamada and Casey (2001).

5 Eurostat (1993), Aldrich (1982), Johnson (1998), Table 1.1 and McHale (1999).

6 The values of private pension benefits are modelled using data on the rules of actual system rather than the illustrative target replacement rates employed in Eurostat (1993). The latter also ignores the important issue of lack of portability of defined-benefit occupational pensions: see below.

7 See Whiteford (1995) for a discussion of these issues.

8. The defined contribution schemes included are the new mandatory scheme in Sweden and personal pensions in the United Kingdom. The latter are mandatory in the sense that people must make some provision for a second pension above the basic level, but this can be through either the public-sector scheme, an occupational scheme or a personal pension plan.

9. Sections 2 and 3 present the core empirical results: the value of pension benefits in the nine countries. The results are presented in a standard format and on standard assumptions. Pension benefits are calculated for a full-career worker earning various proportions of economy-wide average earnings, between 0.3 times and five times the average. Although most workers, of course, lie in the bottom part of this scale, a broad range of earnings was chosen to illustrate properly the impact of ceilings on pensionable earnings. People are assumed to retire at the standard pension age, which is typically 65 in these countries.

10. The average earnings data are the pay of the average production worker, as set out in OECD (2000). For reference, Table 1 shows these earnings levels in national currency and in United States dollars. Earnings have been translated into dollars using OECD purchasing power parities, which calculate the cost of a common basket of goods in each country. Market exchange rates, of course, fluctuate wildly, and can generate very misleading results. Real earnings, both of the illustrative worker and the economy as a whole, are assumed to grow at 2% a year.

Table 1. Earnings of the average production worker

	National currency	US dollars at PPP
Canada	35 000	30 200
Finland	140 600	23 300
Germany	59 500	29 600
Italy	38 873 400	24 000
Japan	4 203 500	25 800
Netherlands	57 500	27 800
Sweden	215 500	22 400
United Kingdom	17 500	26 600
United States	29 100	29 100

Note: all values rounded to the nearest hundred. Conversion to dollars uses OECD purchasing power parities

Source: OECD (2000)

11. The model uses the current parameters of the system, including any future changes that have already been legislated. Governments, of course, frequently reform pension systems. People retiring today, for example, have spent their working lives in many different and changing regimes. Their pension benefits can be calculated under many different rules. This is therefore an unrealistic assumption, but it is difficult to formulate a sensible alternative.

12. Looking into the future, some countries adjust some parameters of their pension system in line with prices. This can have radical effects on the long-term structure of the scheme. The baseline results therefore assume that parameters will rise in the long term in line with earnings. Where pension programmes are resource-tested, it is assumed that the individual has no sources of income other than the mandatory pension.

13. Section 4 looks at voluntary private pensions in three countries: Canada, the United Kingdom and the United States.⁸ Section 5 extends the analysis in a number of ways. First, the main analysis assumes a single worker: this section looks at the treatment of married couples. Secondly, the section examines the treatment of workers with less than a full career: what happens to people's pension entitlements when they are out of work because they are either unemployed or caring for children or elderly relatives? Thirdly, the baseline assumption is that the worker is employed, but countries differ in their treatment of the self-employed. Section 5 ends with an exploration of the issue of post-retirement indexation of pension benefits. The baseline results provide only a snapshot picture of pension benefits at normal pension age, but the procedure for uprating benefits has substantial effects on the value of the lifetime stream of pension payments. Section 6 concludes.

1. Country descriptions

1.1 Canada

14. Canada's public pension system is made of three components. A universal, flat-rate pension, known as old-age security, can be topped up with an income-tested benefit, known as the guaranteed income supplement. A tier of earnings-related benefits is known as the Canada Pension Plan/Québec Pension Plan. The two plans offer broadly similar benefits.

1.1.1 Basic pension

15. The basic tier is subject to a residency test, with $\frac{1}{40}$ th of the maximum pension earned for each year of residence after age 18 up to a maximum of 40 years. A minimum of ten years' residency is required to receive any benefit. The 1999 benefit level was C\$411.23 a month — 14% of average earnings — payable from age 65. This pension is subject to a means test operated through the tax system (often described as a 'claw-back'). Once income exceeds C\$53 215 it is withdrawn at a 15-per-cent rate. This ceiling is equivalent to just over 1½ times average earnings. It is indexed to prices.

1.1.2 Income-tested pension

16. An income-tested supplement is available to low-income pensioners. This gives a maximum pension, including the universal benefit, of C\$899.95 (31% of average earnings) for a single person and C\$1 459.12 (50%) for a couple. The benefit is withdrawn against income other than the basic pension at a 50-per-cent rate. Both the basic and means-tested components of the state pension are price indexed.

1.1.3 Earnings-related pension

17. The second-tier, earnings-related pension targets a 25-per-cent replacement rate. It is based on average lifetime salary, with earlier years' pay revalued in line with economy-wide earnings. A single year's contribution is sufficient to generate an entitlement. The averaging formula excludes the 15% of years between age 18 and 65 with the lowest earnings and any years spent caring for a child under age seven. Currently, virtually all retired men and 85% of women qualify for some earnings-related pension

8 As noted previously, occupational plans are considered alongside public schemes in Finland, the Netherlands and Sweden. Data on the rules of schemes in Germany and Japan are unavailable, but occupational pensions are less important in these countries.

benefits. The government expects the latter proportion to increase to 90% by 2050. The maximum earnings-related pension is C\$751.67 a month (26% of average earnings). People earning less than C\$3 500 a year (10% of average earnings) are not required to contribute. There is a ceiling of C\$37 4000 (107% of average earnings) to both contributions and benefits, which is indexed to average earnings, while the contribution floor is frozen in nominal terms. The value of the pension after retirement is updated annually in line with prices.

1.1.4 *Private pensions*

18. Over 40% of the Canadian workforce are members of occupational pension schemes, known as retirement pension plans. Around 45% of this total are members of public sector schemes. This gives a coverage rate in the private sector of around 30% compared with nearly 100-per-cent coverage among public-sector employees. There was a shift to defined-contribution schemes in the 1980s and 1990s in the private sector, but these plans still account for just 13% of total members (including hybrid plans with defined-benefit and defined-contribution elements). Over 60% of members are in final-salary defined-benefit schemes, with 10% in schemes with an average-salary formula and 20% in plans that provide a flat benefit for each year of membership. Most schemes cover the entire workforce, but 20% of members are in schemes reserved solely for members of trades unions.

19. Most occupational schemes —covering 90% of members — are compulsory for people eligible to join. Typically, eligibility is determined by years of service (to a legal maximum of two years). Vesting rules vary by province, but are generally two years of membership or five years' service. Some also depend on age. Pensions can be transferred to another occupational scheme or a personal plan when a worker changes jobs, or 'preserved' in the old occupational scheme until an employee reaches pension age.

20. Pension age is generally 65, but a significant minority of public-sector members can claim their pension at 60. The accrual rate in public sector schemes is nearly always 2% of earnings for each year of service. The earnings formula is usually based on the best five years. In the private sector, 2% is also the most common accrual rate, accounting for nearly half of members. But almost a third have accrual rates between 1.5 and 2% and another 10% between 1 and 1.5% per year of service. There has been a shift towards the norm of two-per-cent accrual, partly because this is the maximum allowed in the income-tax regulations.

21. Most schemes are integrated with the public earnings-related scheme, giving a lower accrual rate (usually 1.3 to 1.5%) on the slice of earnings up to the ceiling for the second-tier pension. Lump-sum benefits are not permitted.

22. In 1989, post-retirement indexation was automatic for 70% of members of public-sector schemes, but only for 7.5% in the private sector. However, only 28% of public sector members were guaranteed full inflation uprating. Most large schemes, however, provided for *ad-hoc* increases that generally compensate for about half of inflation.

1.2 *Finland*

23. Finland has a two-tier pension system, including a basic state pension and a range of different earnings-related plans for different groups of workers.

1.2.1 Basic pension

24. The basic pension (known as the national pension) is a universal benefit, withdrawn against pension income from the earnings-related schemes. It is payable from age 65. The parameters of the system differ from one municipality to another to reflect regional differences in the cost of living. The basic benefit is between FM26 472 (19% of average earnings) and FM31 500 a year (22% of average earnings).⁹ If other pension income exceeds FM2 990 a year, then the basic pension is reduced by 50% of the difference. This threshold is equivalent to 2% of economy-wide average earnings. No pension is payable once other pension income exceeds FM54 500 to FM64 560 — 39 to 46% of average earnings — depending on municipality and marital status.¹⁰

25. Eligibility is determined by a residence test. The full benefit is payable with 40 years residence as an adult, with *pro-rata* adjustments for shorter periods of residence.¹¹ The basic pension benefit and the parameters of the means test are updated annually in line with prices.

26. The basic pension is an individual entitlement. Supplements that are payable in respect of spouses with no entitlement of their own are being phased out.

1.2.2 Earnings-related pension

27. A range of different second-tier schemes covers different groups in the labour market. Table 2 shows membership of the different plans. Until the early 1990s, public-sector pensions were more generous than the private-sector schemes, but the rules in the two sectors were then aligned.

28. As with the basic pension, the earnings-related benefit is payable from age 65. The benefit is 1.5% of average pensionable pay for each year of employment between age 23 and 59. Between 60 and 64, a pension of 2.5% of pay is earned for each year of coverage. The system also covers people when they are not working, with an accrual rate of 1.2% a year for each year on unemployment benefits. There is a ceiling of 60% to the total replacement rate, so someone covered continuously from age 23 will reach the maximum benefit at age 62.

29. There is no contribution floor, and no ceiling either to contributions or to benefits. Pensionable pay is defined as gross earnings less employees' pension contributions averaged over the last ten years of employment in a particular scheme, revalued in line with a mix of economy-wide earnings and prices.¹² Years with exceptionally low earnings can be ignored.

9 The modelling uses the maximum municipal benefit level.

10 There remains a small basic element that is not means-tested. This has been ignored because it is worth just FM63 a month in 2000 (0.5% of average earnings) and will be abolished completely in 2001.

11 Note that the elderly who have spent long periods of their working lives in other countries are entitled to general, means-tested social assistance. This guarantees a minimum income of between FM23 508 and FM24 564 a year (around 17% of average earnings). This is between 12 and 22% below the means-tested pension. Again, the different benefit levels apply in different regions. Married couples are each entitled to 85% of the value of the benefit for a single person.

12 The averaging period was four years until 1996. The increase to ten years is being phased in gradually and will be implemented in full from 2005.

30. After retirement, the earnings-related pension is uprated using a formula of 20% of earnings inflation and 80% of price inflation.¹³ The Central Pension Security Institute co-ordinates the schemes, resulting in a single pension payment even for people who have joined different plans at different stages of their working lives. About 85% of workers in the private-sector are members of plans operated by insurance companies. Large employers — with a workforce of 300 or more — are permitted to set up their own pension funds.

Table 2. **Coverage of different earnings-related pension programmes in Finland**

<i>Coverage</i>	<i>Scheme</i>	<i>Members (%)</i>
Private-sector employees		
Main scheme	TEL	51.7
Blue-collar workers in construction <i>etc.</i>	LEL	3.8
Household workers, low-earner, short-contract workers	TaEL	1.2
Sailors	MEL	0.3
Self-employed		
Farmers	MYEL	5.4
Other self-employed	YEL	7.3
Public-sector employees		
Central government	VEL	8.7
Local government	KVTEL	20.9
Church	KiEL	0.7

1.3 *Germany*

31. The German public pension system has a single tier, including both redistributive and insurance elements. Coverage of occupational pensions is broad.

1.3.1 *Earnings-related pension*

32. The formula for the earnings-related pension is based on a system of points. One point is awarded for a year's contributions at the average earnings of contributors (up to the contribution ceiling). Contributions are levied on earnings between DM630 and DM102 000 a year, equivalent to one and 171% of average earnings respectively.¹⁴ People in short-term employment (up to 50 working days a year) are exempted regardless of their earnings, but people who work 15 hours or more a week must contribute even if their earnings fall below the floor. The ceiling also applies to the number of benefit points earned. Average covered earnings were DM53 082 in 1999 and are forecast to be DM54 513 in 2000. This is equivalent to 92% of the earnings of the average production worker (the average earnings measure used in this paper). Contributions paid on earnings of this level therefore earn a worker one pension point.

13 Pensions drawn early (between 60 and 64) have a more generous indexation procedure: 50% of earnings inflation and 50% of price inflation.

14 There is a lower floor of DM530 and ceiling of DM86 400 in the new Länder.

33. The sum of points at pension age is multiplied by a 'pension value', which was DM47.65 in 1998-99.¹⁵ Low-income workers' points can be increased by up to 1½ times to a maximum of 75% of average earnings of contributors (*i.e.*, 0.75 points) if they have contributed for 35 years. The first three year's contributions before the age of 25 are adjusted upwards to the lesser of 75% of the individual's total pension entitlement or 75% of his or her lifetime average pay. The pension is payable from age 65 with five years' contributions and from age 63 with 35 years'. (Fewer than five years' contributions earn no benefit.) The 'pension value' is uprated annually in line with net wages. This indexation procedure affects both the post-retirement benefit and the pre-retirement revaluation of earnings in the benefit formula.

1.3.2 Schemes for public-sector employees

34. Around 2½ million civil servants are not covered by the general state pension scheme. The civil service pension plan pays 1.875% of final salary for each year of service up to a maximum replacement rate of 75% (*i.e.*, after 40 years' service). No pension is paid for periods of service of less than five years. The normal pension age is 65. There is a minimum pension set as a proportion of the earnings of a low-level public servant. Pensions in payment are uprated in line with the gross civil service pay.

35. Other public-sector workers — around four million of them — remain in the general state pension scheme but are also entitled to supplementary pensions.

1.3.3 Occupational pensions

36. Around a quarter of private-sector employees in Germany are covered by occupational pension schemes, although coverage has been declining in recent years. They are mainly provided by larger employers. There are four main types of scheme.

37. The predominant type of plan is book-reserve financed pensions. Under this type of scheme, there is no independent pension fund, just a pension reserve shown as a liability on the firm's balance sheet. Pensions must, however, be insured through the mutual Pension Insurance Association. Book reserve pensions account for more than half of members of occupational pension schemes.

38. The second most common type of provision is so-called 'pension funds', covering 19% of those with occupational pensions. These are captive insurers, set up as mutual benefit associations.

39. The third type of occupational plan is an individual or group policy taken out by the employer on behalf of employees. These schemes, known as direct insurance, account for 14% of occupational pension membership.

40. The final method of providing occupational pensions is through 'support funds'. These are legally separate institutions, established by a single employer or a consortium of firms. They can be set up either as a limited company or a registered association. Support funds are normally used in conjunction with other plan types to provide occupational pensions.

41. Book reserves and support funds are most common among larger employer: smaller firms tend to use pension funds or direct insurance.

15 There is currently a lower pension value in the new Länder of DM40.87.

42. Pensionable age in occupational plans is aligned with that of the public scheme. More than half of schemes pay only a flat retirement benefit, regardless of the number of years of membership of the scheme (once onerous vesting conditions — ten years' membership — have been met). This rate can, however, vary with the employee's grade. Higher grades tend to get a higher replacement rate to compensate for the ceiling in the public scheme. More than a third of occupational plans pay a flat rate benefit depending on scheme tenure. Only 10% of schemes are fully earnings-related.¹⁶ Around two-thirds of schemes pay an annuity income stream with the remainder (predominantly smaller schemes) offering a lump sum alone.

43. Occupational pensions are much less important in Germany than in Canada, the United Kingdom and the United States, for example. Overall, they account for less than 5% of pensioners' incomes. Given also the absence of detailed data on the rules of occupational schemes, they have not been modelled.

1.3.4 *Social assistance*

44. Although there is no specific minimum pension or means-tested pension in Germany, the elderly can claim the general safety-net benefit (known as 'Sozialhilfe', or social aid). Almost half of social-assistance recipients are elderly. The minimum income is DM625 a month for a single person and DM1 129 for a couple. These are equivalent to 13 and 23% of average earnings respectively.

1.4 *Italy*

45. The Italian pension system has undergone two major reforms in the 1990s with further change under discussion. The parameters of the system adopted here are those applying to labour-market entrants after 1996.

1.4.1 *Earnings-related pension*

46. The normal pension age under the new system will be 65 but it will be possible to draw the pension from age 57, subject to five years' contributions being paid and to actuarial adjustments of the pension value (see below). The new Italian system is similar to so-called 'notional-accounts' schemes, also recently introduced in Latvia, Poland and Sweden.¹⁷

47. The pension benefit depends on the value of contributions paid. Contributions are uprated in line with a five-year moving average of GDP growth until the year of retirement. The resulting 'notional capital' is then multiplied by a 'transformation coefficient', akin to the annuity rate in a true defined-contribution system. This coefficient varies with the age at which the pension is claimed, from 4.72 at age 57 to 6.136 at age 65.

48. The minimum pay for contribution purposes is L67 474 a day (41% of average earnings) or the industry-specific minimum wage if higher. Once this threshold is reached, contributions are paid on the whole of earnings, not just the excess over the floor. The maximum earnings for benefits are L141 991 000 a year, nearly 3.7 times average earnings. This applies to labour-market entrants from 1999. Employees' contributions are 8.89% of earnings up to L65 280 000 a year (168% of average earnings) and 9.9% thereafter. The standard employers' contribution rate is 23.81%, but there are many lower rates applying to

16 These data refer to the old Länder in 1990. Source: StaBA (1995).

17 See Disney (1999b).

specific industries and regions. However, individuals' notional accounts in the new system will be credited for the moment with a higher 'equilibrium' contribution rate rather than actual contributions paid.¹⁸

49. Pensions in payment are indexed to price inflation. The calculation of the transformation coefficient includes an implicit real interest rate of 1.5%. The legislation allows the government to increase pensions in payment more rapidly than prices when GDP growth exceeds 1.5%.

1.4.2 Social assistance

50. The switch to the new notional accounts system led to the abolition of the previous minimum pension as part of the aim of linking benefits more closely to the contributions that have been made. There remains, however, a social assistance benefit for the elderly (known as the 'assegno sociale' or social allowance). The benefit is available to people over 65. It guarantees a minimum income of L6 593 600 per person (so couples receive double the amount of single people). This minimum is equivalent to 17% of average earnings for a single person.

1.5 Japan

51. The Japanese public pension system is another two-tier regime. There is also a substantial occupational-pension sector.

1.5.1 Basic pension

52. The basic pension is payable from age 60 with a minimum of 25 years' contributions. The pension age will be increased in future, to reach 65 for men in 2013 and for women in 2018. Currently, 96% of people of pension age receive some basic pension. To receive a full pension, 40 years' contributions are required. Workers earning below the contribution floor of ¥92 000 a month are exempt. This floor is equivalent to 26% of economy-wide average earnings. Periods of exemption accrue pension at only one third the normal rate. The full basic pension is ¥804 200 a year, 19% of average earnings. Average receipt is rather lower than this level: around ¥560 000 a year. The basic pension is price indexed.

1.5.2 Earnings-related pension

53. The earnings-related pension, known as employees' pension insurance, pays 0.75% of lifetime average earnings for each year of contributions. The reform enacted in March 2000 will reduce this to 0.7125% for each year of membership, a five-per-cent cut in the accrual rate. There is a ceiling on contributions and earnings eligible for benefits of ¥7 000 000 a year, or 168% of average earnings. Each year of coverage between age 60 and 64 adds an extra ¥1 625 a month. Earlier years' earnings are revalued in line with economy-wide average net earnings. Benefits in payment in the earnings-related tiers will also be uprated in line with prices following the March 2000 reform. Previously, they were indexed to net earnings. The pension is payable from age 60, but this will increase to 65 by 2025, a slower time scale than the increase in pension age for the basic benefit.

18 According to Hamann (1997), the actual contribution rate (employers' plus employees') was 32% in 1995 compared with the 33% credited. The self-employed are credited with 20% of their income compared with a contribution of just 15%.

1.5.3 Occupational pensions

54. Some 90% of employers also offer some kind of retirement package, but these differ substantially in the type of benefit provided.

55. First, more than 70% of employers offer a lump-sum retirement allowance, a benefit also used as a severance payment. These are financed through book reserves. Payouts at pension age in 1997 averaged around ¥20 million, or 4.75 times economy-wide average earnings.

56. Secondly, around 35% of employees are members of tax-qualified pension plans, to which employer contributions are exempted from the corporate income tax. Most of these schemes allow the full benefit to be commuted into a lump sum and annuities are typically ten-year certain (*i.e.*, payable for a ten-year term, even if the beneficiary dies during that period). Only firms with 15 or more employees can establish a tax-qualified pension plan.

57. Thirdly, about a fifth of employees are covered by an Employees' Pension Fund. Contributions are typically 1.6 to 1.9% each from both employees and employers. These funds are the only scheme allowed to contract out of the state system. Pension funds can contract out if they pay a benefit at least 30% larger than that which would have been received from the state earnings-related scheme. In return, social security contributions are rebated at a rate that varies between 3.2 and 3.8%, averaging 3.5%.¹⁹ Around half of Employees' Pension Funds allow commutation of benefits into a lump sum. The rules allow up to 90% of the pension above the value that would have been received from the state earnings-related scheme to be taken as a lump sum. Benefits taken as an annuity are generally provided as a traditional life annuity. Only employers with 500 or more employees are permitted to establish an Employees' Pension Fund. Employees can also contribute to these funds. Around a third of employees contribute — mainly in larger firms — paying a third of the value of the employer contribution. Employees leaving a plan with less than 20 years' membership can take the accumulate entitlement as a lump sum. This can then be transferred to the pension fund association, which acts as a kind of clearing house, investing the money until the member retires. There is no provision for pension transfers into a new employer's plan. After 20 years, the pension must be deferred (until the employee reaches retirement age).

58. Finally, nearly 3% of employees are members of occupational plans that are independent of the EPF system.

59. Analysis of the system is complicated further by the fact that many employers offer more than one type of plan, as Table 3 shows.

60. Nearly all of these schemes are defined benefit. However, there has recently been strong growth in defined contribution plans. These include Employees' Property-Accumulating Pension Plans and Smaller Employers Mutual Aid Plans. Employers typically have a mandatory retirement age of 60, and pension benefits are paid from that age. The 1999 pension reform introduces a new defined contribution plan that can be set up either as an individual or a company plan. The latter is modelled on the 401(k) plan of the United States.²⁰

19 Note that the National Pension Fund pays for the revaluation of earlier years' earnings and post-retirement indexation of benefits for the people contracted out of this state scheme. The government sets the size of the rebate, depending on the soundness of the fund's finances.

20 See Takayama (2000*a,b*) for a detailed presentation.

Table 3. Coverage of different private pension arrangements in Japan

<i>Tax-qualified</i>	<i>Employees' Pension Fund</i>	<i>Separate occupational scheme</i>	<i>Proportion of employees</i>
x			24.5
x	x		10.0
	x		9.5
		x	1.5
	x	x	0.7
x		x	0.4
x	x	x	0.3

1.6 *Netherlands*

61. The Netherlands has a two-tier pension system, consisting of a flat-rate public scheme and earnings-related occupational plans. Although there is no statutory obligation for employers to offer a pension scheme to their employees, industrial-relations agreements mean that 91% of employees are covered. These schemes are therefore best thought of as quasi-mandatory.

1.6.1 *Basic pension*

62. The public pension in the Netherlands is a flat-rate benefit, payable from age 65. The full benefit is payable with 50 years' residence between age 15 and 64 and, if resident and earning, if contributions have been made. The pension value is reduced for any gaps in residency or the contribution record. People earning less than NLG8 617 a year (15% of average earnings) are exempted from contributions. There is also a contribution ceiling of NLG56 792, just over twice average earnings. The floor and ceiling are set equal to the thresholds of the first bracket of the income tax schedule.

63. The pension benefit was NLG1684.70 a month for a single person and NLG2324.54 a month for a couple in 1998-99. These benefit levels are equivalent to 35 and 49% of average earnings respectively. The benefit value is uprated biannually in line with the net minimum wage.

1.6.2 *Occupational pensions*

64. The Netherlands also has a private pension system with broad coverage. The system consists of 64 industry-wide schemes, of which 95% are defined benefit. Dutch companies are free to opt out of these plans if they offer their own scheme with equivalent benefits. There are around 866 of these single-employer plans. A further 30 000 mainly smaller employers offer schemes operated by insurance companies on their behalf.

65. The pension age in these schemes is 65, although people are ineligible to join until they reach age 25. Most schemes give 1.75% of final salary for each year of service, giving a replacement rate of 70% after a complete 40-year career. The law also allows for average-salary plans giving 2.25% of average pay for each year of service. Three-quarters of plans are based on final salary; the rest are mainly average-salary schemes.

66. Broad, industry-wide coverage of schemes reduces the problem of lack of portability. Although there is no legal requirement to index pension rights of people leaving a scheme before retirement, most

schemes offered full price indexation. Regulations now stipulate immediate vesting and transferability of pension rights between schemes: the new employer must assume the previous employer's pension liability. The portability regime is therefore similar to the system in the United Kingdom, discussed below. Benefits in payment are also typically indexed to earnings, although there is no legal uprating requirement.

67. Occupational pensions are integrated with the public pension system. Tax rules allow a maximum benefit of 70% of final pay from both public and private systems, so private benefits are reduced by the value of the public pension entitlement, a process known as 'franchising'.

68. The franchise interacts in complex ways with the state pension. A married man with a non-working wife would be assumed to receive nearly NLG27 900 from the public pension system (NLG2 324 x 12). At the earnings of the average production worker (NLG57 500), his total pension benefit would be capped at NLG40 250 or 70% of pre-retirement pay. The private pension benefit would be the difference between this cap and the public pension, NLG12 350. A single person with the same level of earnings would get the same pension, but would get only NLG20 200 from the public scheme with a larger top up from the private plan. A couple each earning half of the average production worker's pay would both have their pension reduced by the married couple's benefit. Each would get 70% of the difference between their earnings (NLG57 500/2 = NLG28 750) and the public pension, *i.e.*, (NLG28 750 — NLG27 900) x 70% = NLG600. The couple's total pension would therefore be NLG29 100, giving a replacement of just 51%.

1.7 Sweden

69. The Swedish pension system has also recently undergone fundamental reform. The new regime, introduced in 1999, applies to people aged 45 or under at the time of reform. Older workers — aged between 45 and 62 — will be covered proportionally by the old and the new systems. The modelling covers only the new system, which has three tiers.

1.7.1 Earnings-related pension

70. The new earnings-related scheme, known as the income pension, is based on 'notional accounts'.²¹ Contributions of 16% of pay will be credited to the notional account, and will then be uprated in line with a three-year moving average of economy-wide earnings.²² Contributions are only levied when earnings exceed a floor of SKr8 952. There is a ceiling to benefits and employee contributions of SKr279 750, but there is no cap on employer contributions (even though pension rights do not accrue on earnings above the ceiling).²³ There is provision for 'imaginary' contributions for periods of unemployment, sickness, education and caring responsibilities. These are paid by the state rather than the employer on the basis of the value of the out-of-work benefit. Some social security contributions can be levied on the benefit value with the state making the total up to 18.5%.

21 Notional accounts are designed to mimic a defined contribution scheme, but are in fact nearly equivalent to a traditional pay-as-you-go defined benefit scheme. For example, Scherman (1999), the director of the Swedish National Social Insurance Board points out: "The reality of the new Swedish system is that contributions, as the law is formulated, are set independently of pension entitlements just as in every PAYG defined benefit scheme...This law as such does not prevent an increase (or decrease) in contributions without affecting pension rights." See also Disney (1999b).

22 The index includes average pensionable earnings (and so excludes pay over the ceiling). It also includes the value of early retirement pensions.

23 Note that the floor and ceiling are defined technically as 24% and 7.5 times the base amount (of SKr37 300) respectively.

71. At retirement, the accumulated notional capital will be converted to an annuity. The calculation of the annuity coefficient will depend on individual retirement age and contemporaneous life expectancy (based on the previous five years' unisex mortality table). It does not therefore aim to project the actual life expectancy of the cohort and so excludes any future mortality improvements. A real return of 1.6% a year will be assumed in this calculation. Retirement will be possible from age 61. Illustrative forecasts of the annuity coefficient at age 65 are 15.4 for 2000 rising to 15.9 by 2020. This implies a pension of 6.5% of accumulated notional capital, falling to 6.3% in 2020. The annuity coefficient is currently 18.2 for retirement at 61 and 13.0 if the pension claim is deferred to age 70.

72. After retirement, pensions will be uprated in line with average earnings less a 'growth norm' of 1.6%. So if real wage growth falls short of the norm, the real value of pensions will fall. For example, assume inflation is 2.5% and real wages grow by 0.5%. The pension will be increased by 1.5%, equivalent to a real cut of 1%.

73. There is also a 'balance mechanism' to protect the system's finances at times of pressure. If total assets (the buffer fund plus contribution revenues) fall below total liabilities (pension benefits) then both the indexation of pensions in payments and the rate of return credited to the notional accounts of workers are reduced.

1.7.2 *Personal pensions*

74. A further 2.5% of earnings will be paid into individual pension accounts, known as the premium pension. People have a broad choice of where these funds are invested. At retirement, a new public agency will be responsible for converting the accumulated balance into an annuity. Alternatively, people will be able to choose a variable or 'participating' annuity, where their funds continue to be invested by their chosen fund manager. These annuities do not have a guaranteed value but compensate for this risk with a higher expected rate of return.

1.7.3 *Income-tested pension*

75. Low-paid workers will be protected by a 'guarantee pension'. This is essentially an income-tested top-up to people with low levels of notional-accounts benefit. Eligibility for the guarantee pension will be earned with three years' residency. Maximum pension is earned with 40 years' residency and is reduced proportionally for shorter periods of residency. For a single person the guaranteed benefit is SKr77 958, or 36% of average earnings.²⁴ The guarantee pension is withdrawn at 100% against the first SKr47 000 (21% of average earnings) of income from the earnings-related pension, thereafter at 48%. Only when earnings-related pension income exceeds SKr114 500 — or 51% of average earnings — is entitlement to the guarantee exhausted.²⁵ Simulations suggest that around 40% of the pensioner population will be eligible for the guarantee pension.²⁶ The guarantee level will be price indexed, implying increased reliance on the earnings-related component over time. General social assistance programmes protect people who do not meet the residency requirements for a guarantee pension.

24 Again, there is a general social assistance scheme that will protect the elderly who have spent most of their working lives in other countries. The social assistance targets a much lower income level: less than half of the minimum pension.

25 Note that the thresholds are defined formally as 1.26 and 3.07 times the base amount.

26 Sundén (1999).

1.7.4 Occupational pensions

76. Sweden also has employer-provided pensions with broad coverage: the four major occupational schemes together cover 90% of employees. The four main schemes are:

- a plan for private-sector, blue-collar workers (SAF-LO)²⁷
- a plan for private-sector, white-collar workers (ITP)
- a plan for employees of the central government
- a plan for employees of local government

77. Pensions for blue-collar workers are managed by a mutual insurance organisation (AMF). They are defined benefit and partially funded. White-collar workers' pension can be provided through a similar mutual company (SPP). Some employers make balance-sheet provisions through book reserves, accounting for 40% of workers in the ITP programme. In this case, another organisation (PRI) administers pensions in payment and provides actuarial estimates of future pension liabilities. Finally, a small number of large companies have separate pension funds, along the lines of occupational schemes in the United Kingdom and United States. While private-sector employers provide occupational schemes voluntarily, they are negotiated as part of collective agreements and so are probably best described as 'quasi-mandatory'. They are compulsory from the point of view of the employee, who must join a scheme if one is offered. The public-sector plans, managed by local or central government bodies, are pay-as-you-go financed. Table 4 shows the division of occupational pension coverage, totalling 2.85 million in 1999, between the four main plans.

Table 4. Occupational pension coverage in Sweden by scheme, 1999

Type of worker	Scheme	Coverage (% of total)
Blue-collar, private sector	STP/SAF-LO	35
White-collar, private sector	ITP	21
Central government	—	9
Local government	—	35

78. The standard pension age for occupational plans is 65, and there is a minimum entry age of 28.

79. The new SAF-LO scheme for blue-collar workers, which replaced the defined benefit STP plan in 1995, is defined contribution. Employers contribute 2% of employees' salaries to the mutual insurance organisation managing the scheme, up to the same ceiling as the state scheme (around 130% of average earnings). Total contributions, including those to pay for the old STP plan, averaged 3.15% in 1996, although some employers pay as much as 5%. Workers can choose either to invest the money in a mutual fund of their choice or to opt for a guaranteed nominal return, typically 3%. They can switch funds once a year, either between the two investment options or between different mutual-fund providers.

80. The ITP scheme for white-collar workers has also been reformed recently. In 1999, the pension formula shifted from pure defined-benefit to a mix of defined benefit and defined contribution. The defined benefit arm offers 10% of final salary on earnings up to the ceiling of the state pension system (around

27 This new scheme was introduced in 1995 to replace the old STP programme. New scheme entrants after 1995 (*i.e.*, those aged 28 or under at that time) receive benefit only under the new scheme. Transition provisions for existing STP members give a mix of benefits under the old and new regimes.

130% of average earnings). Between this ceiling and a threshold of around 3.5 times average earnings, the pension pays 65% of final salary. From around 3.5 to 5.2 times average earnings, the accrual rate is 32.5%, with no pension entitlement on earnings above 5.2 times economy-wide average pay.²⁸ The ITP scheme therefore is a top-up to the state pension, paying much larger benefits to higher- than to lower-paid workers. A full pension is earned with 30 years' contributions between the ages of 28 and 65. Shorter tenures result in a proportionally reduced pension. The normal pension age is 65, but actuarially reduced benefits are available from age 62.

81. White-collar workers earning above the state-pension contribution ceiling can opt out of the main, defined-benefit ITP scheme. Instead, they take out a defined contribution plan with a financial-services company, and their employer continues to contribute.

82. Finally, ITP members also have a supplementary, defined contribution plan. As in the SAF-LO, workers can choose between a guaranteed nominal return on contributions (again typically 3% a year) or to invest the contribution in a mutual fund of their choice. There are similar restrictions on switching.

83. The public-sector schemes cover all full-time workers and part-timers that work 40% or more of the full working week. The pension plan for central-government employees has the same accrual structure as the ITP plan, paying 10% of final salary below the ceiling for the state pension, and a higher replacement rate for higher earnings. 'Final' salary is defined as the average of the last five years before retirement. Although the normal pension age is typically 65, 30 years' contributions between age 28 and 65 are sufficient for a full pension. Workers can retire on a full pension from age 60 if they meet the contribution condition. The benefit is reduced proportionally for less than full contribution records. Although public plans are pay-as-you-go financed, 'notional' contributions of around 6% of earnings are levied. In addition, there is a defined contribution top-up pension, to which the government contributes 1.7% of pay.

84. There has been a marked shift from defined benefit to defined contribution formulae in Sweden's occupational pension schemes. In the main, these are designed as top-up schemes to the state pension and are mainly targeted at high-paid workers. Currently, they account for 10% of pensioners' incomes. Pensions are portable between employers within a particular programme and between the four main schemes.

1.8 United Kingdom

85. The United Kingdom has a complex pension system, which mixes defined benefit and defined contribution formulae and public and private provision. The public scheme has two tiers, but most workers 'contract out' of its second tier into private pensions.

1.8.1 Basic pension

86. The first tier of the system is the basic state pension, worth £66.75 in 1999-00. This is a flat-rate benefit, payable to all people of pensionable age who meet the contribution condition. There is a dependants' supplement of £39.95 a week payable when one partner has no basic pension entitlement of their own. The single person's pension is worth 20% of average earnings; the couple's pension 32%. Pension age, currently 60 for women and 65 for men, will be equalised at 65 from 2010. The simulations

28 These thresholds are again formally defined in terms of the base amount: 7.5, 20 and 30 times the base amount respectively.

here assume the medium-term pension age of 65 for both sexes. People need to have paid social security contributions for around nine-tenths of their potential working lives (44 years). However, the apparent severity of this test is reduced by credits for periods in education and in receipt of certain social security benefits for unemployment or disability. For people out of the labour market caring for children or sick relatives, home responsibilities protection, introduced in 1978, reduces the number of years of contributions needed to get the full pension. People with an incomplete contribution record can claim a proportionally reduced pension, subject to a minimum of a quarter of the full pension level. The Government Actuary (1995) assumes that these and other provisions will increase the proportion of women with their own entitlement to the basic pension from 70% in 1995-96 to 100% from 2010-11 onwards. The average rate of benefit paid is expected to increase from 73% of the standard rate in 1995-96 to 83% in 2010-11 and 91% in 2020-21. The basic pension has been uprated annually in line with prices since 1981.

1.8.2 *Earnings-related pension*

87. The second tier of the system offers individuals a choice of provision. The state earnings-related pension scheme, known by its acronym Serps, pays a defined benefit pension. Note that a reformed version of the Serps scheme, to be renamed the state second pension, will shortly be introduced. However, the government has left open the long-run structure of the new scheme, which is likely to move towards a flat-rate formula. The new scheme will, in its early stages, increase the accrual rate for low earners. But without detailed, long-term parameters, the modelling looks only at the old Serps scheme.²⁹

88. The 1988 pension reform reduced the target replacement rate under Serps from 25 to 20%. This will be fully effective from 2010-11. The scheme also accelerated accruals for earlier cohorts, so that a full pension could be earned after just 20 years. From 2027-28, all new retirees will have spent a full working life in the scheme, and the accrual rate will be 20/49 or 0.41% for each year of membership. Serps is calculated on average lifetime salary, with earlier years' pay uprated in line with average economy-wide earnings. The benefit is then price-indexed after retirement. Serps benefits are earned only on 'band earnings' between the lower and upper earnings limits of the social security system. In 1998-99, the floor was £66 a week and the ceiling £500 a week (20 and nearly 150% of average earnings respectively). This gives a maximum pension of a little over 25% of economy-wide average earnings in the long-term. The contribution floor is also the minimum contribution level to receive the basic pension. The earnings limits are uprated annually in line with the increase in the basic pension. Since 1981, therefore, they have been price indexed.

1.8.3 *Occupational pensions*

89. Most people, however, are contracted out of Serps, into either an occupational plan, provided by an employer, or a personal pension, bought from a financial-services company, as indicated in Table 5. Occupational schemes are mainly defined benefit, but there has been rapid growth since the mid-1980s in defined contribution occupational plans, albeit from a very low base.³⁰ Regulatory changes mean that many employers now prefer to offer their employees a group personal pension rather than a defined contribution occupational plan. The aggregate value of employer contributions to personal pensions in their employees' behalf grew two-and-a-half fold between 1994-95 and 1998-99.

29 See Agulnik (2000) and Disney, Emmerson and Tanner (1999) for a discussion of the reform.

30 See Disney (1995) for a discussion.

90. Both employers and employees pay a lower rate of social security contributions when contracted out and the employee foregoes their Serps entitlement. In return, defined benefit schemes must guarantee a minimum pension and defined contribution plans must levy a minimum contribution.

Table 5. **Second-tier pension provision in the United Kingdom, 1995-96**

	<i>per cent of total coverage</i>
Defined benefit occupational	
Private sector	19
Public sector	18
Serps	35
Defined contribution	
Private-sector occupational	1
Personal pension (including group schemes)	25

Note: Occupational schemes refer only to those contracted out of Serps. Around 1% has a contracted in defined contribution occupational plan on top of Serps and 2% are members of a contracted in defined benefit occupational plan

Source: Department of Social Security (1998b)

91. Defined benefit occupational pension schemes provide a pension usually related to years of membership of the scheme and some measure of final salary when covered by the plan.³¹ Most public-sector schemes pay $\frac{1}{80}$ th of earnings per year of membership, plus $\frac{3}{80}$ ths as a lump sum. So the benefit after a full 40-year career would be half of final salary as an annuity plus $1\frac{1}{2}$ times final salary as a lump sum. Private-sector schemes are more diverse. Around 60% pay $\frac{1}{60}$ ths of final salary. But taking a lump sum (known as commutation) reduces the annuity value. Around a fifth are more generous than this while around 7% pay less than $\frac{1}{60}$ ths or $\frac{1}{80}$ ths plus a lump sum. More than a quarter of private occupational schemes are 'integrated' with the state scheme, reducing benefits to take account of state pensions received. Most cut the pension by the value of the basic state pension or the lower earnings limit (which are broadly similar by law). Other methods of adjustment are more complicated. For someone on average earnings in a $\frac{1}{60}$ ths scheme, integration will typically reduce a full-career pension by around a fifth. The defined benefit pension modelled pays $\frac{1}{80}$ ths — the minimum required to contract out of Serps — but is not integrated with the state pension.³² Benefits after retirement must be limited price indexed to a ceiling of 5%. However, all public-sector and many private-sector plans are fully price indexed.

1.8.4 *Personal pensions*

92. The government introduced in 1988 the option of contracting out of Serps into a personal pension, open to occupational schemes since the advent of the scheme. Table 5 shows that a quarter of employees now has a personal pension. Personal pensions are individual retirement-savings accounts, mainly sold by life insurance companies and banks. In return for foregoing their Serps entitlement, people pay a lower rate of social security contribution. But this contribution rebate must be invested into the

31 Data in this section are taken from the National Association of Pension Funds annual survey. See also Disney and Whitehouse (1994, 1996) and Government Actuary (1996).

32 Disney and Whitehouse (1994, 1996) model defined benefit pension values in a range of illustrative schemes with different benefit formulae.

personal pension scheme. The pension is defined contribution: the ultimate value depends on contributions made, the investment returns earned and the level of annuity rates when the member retires.

93. The government sets the social security rebate, usually every five years, on the advice of the Government Actuary. The rebate is designed as fair compensation for the loss of Serps rights. The Government Actuary calculates the value of Serps and, with assumptions about investment returns and administrative costs, the contribution to a personal pension that should deliver the same level of pension benefit. The rebate has varied with age since April 1996. As the Government Actuary's assumptions are reasonable, the value of a personal pension should be equivalent to the Serps benefit foregone. A model of mandatory personal-pension benefits, therefore, produces the same results as a model of Serps.³³ Around 45% of personal pension members contribute only the mandatory minimum to their plan.

1.9 *United States*

94. The United States has a publicly provided pension benefit with a progressive formula, and different types of occupational scheme with broad coverage.

1.9.1 *Public pension*

95. The public pension in the United States is payable from age 65. The benefit is based on covered earnings between age 21 and age 62. Earlier years' earnings are revalued in line with economy-wide average earnings. The five years with the lowest earnings are excluded from the average. The ceiling for both contributions and benefits is \$72 600 a year — 2½ times average earnings — uprated annually in line with economy-wide earnings. The benefit formula is progressive. The first \$531 a month of average revalued earnings attracts a 90% replacement rate. The band of earnings between \$531 and \$3 202 a month is replaced at 32%. These thresholds are 37 and 220% of average earnings respectively. A replacement rate of 15% applies between the latter threshold and the earnings ceiling. A 50-per-cent dependants' addition is available to married couples where secondary earners have built up a smaller entitlement.

1.9.2 *Social assistance*

96. The United States provide a means-tested benefit for the elderly³⁴ known as Supplemental Security Income. Single people over the age of 65 can be eligible for up to \$6 144 a year depending on assets and other income. The benefit rate for couples is \$9 228 (50% higher than the rate for singles). These are equivalent to around 21 and 32% of average earnings respectively.

97. The asset tests are strict: single people are limited to \$2 000 worth of assets and couples to \$3 000, excluding personal belongings, a home, a car, funeral insurance and life insurance (the last two up to \$1 500 value). There is a small (\$20 a month) 'disregard' in calculating the entitlement. The benefit is then withdrawn at a 100% rate against income above this level.

33 When the scheme was introduced, this was true on average. But because of the effect of compound interest and Serps reforms which affected different cohorts' benefits in different ways, younger workers were over-compensated and older workers under-compensated for contracting out. This had a powerful adverse selection effect — only younger workers contracted out — with a significantly negative effect on the public finances. This is no longer the case, now that the rebate is age-related. See Disney and Whitehouse (1992a,b) and Whitehouse (1998) for a detailed explanation.

34 Disabled people of working age are also covered by this scheme.

98. The modelling and analysis of these benefits is complicated by the fact that states³⁵ can supplement the federally determined minimum. Twelve states pay only the federal minimum.³⁶ Some 28 states administer their own system while 12 offer supplements that are operated by the federal Social Security Administration. The average additional payment in these 12 states is 13% for single pensioners and 18% for couples (Table 6).

Table 6. State-level maximum supplements to Supplemental Security Income

	<i>Supplement, % of Federal minimum</i>	
	<i>Single</i>	<i>Couple</i>
California	35	60
Delaware	27	58
Hawaii	1	1
Massachusetts	25	26
Nevada	7	10
New Jersey	6	3
New York	17	14
Pennsylvania	5	6
Rhode I	13	16
Utah	0	1
Vermont	11	14
Washington	5	3

Note: Washington has two separate regional regimes: the higher supplement is shown. Delaware's supplement applies only to people in care

Source: Social Security Administration (2000b)

1.9.3 Occupational pensions

99. The majority of occupational pension schemes in the United States are final-salary defined benefit schemes. These cover 56% of occupational pension members, with 23% in flat-rate defined benefit plans (which pay a fixed amount for each month of coverage), 11% in average-salary schemes and 6% in defined contribution plans.³⁷

100. The definition of 'final salary' varies, but the most common formula is the best consecutive five years' earnings, accounting for 65% of members. Accrual structures are complex, with only 37% in schemes having a single accrual rate, the most common being between 1.25 and 1.75%. In 41% of schemes, the accrual rate varies with the level of earnings and in another 8%, with the number of years of service. Around half of plans are integrated with social security, usually by using an 'excess formula' that applies a lower accrual rate to earnings covered by social security. The most common normal pension age is 65, although a number of plans only allow retirement once a minimum service level has been achieved.

35 Using the term 'state' to include the 50 states as formally defined plus the Federal District of Columbia and the North Mariana Islands.

36 Note that four of these offer supplements to the disabled but not to elderly beneficiaries.

37 These data are taken from Mitchell (2000). Note that the Department of Labor (1999) reports that defined benefit schemes cover only 49% of members of occupational plans, with 51% in defined contribution schemes alone and 32% in both a defined benefit and a defined contribution plan. Note that 401(k)s are not counted as occupational schemes.

101. Following a series of regulatory changes, nearly a third of schemes now have no minimum age or service requirement for eligibility to join the plan. Another third have a minimum service requirement of one year or less and a final third have a minimum entry age of 21 and a one-year's-service requirement. Schemes are voluntary, but participation rates are high, averaging nearly 80% of full-time employees. Vesting is now most commonly achieved with five year's membership: these schemes account for 85% of members.

102. Post-retirement indexation of benefits is rare: just 3% of members are promised automatic cost-of-living increases and only 4% of schemes have granted discretionary increases in the last five years. Fewer than one in four schemes allow any of the pension to be taken as a lump sum.

2. Empirical results: gross pension benefits

103. The main results of the model of pension benefits in the nine countries are set out in a series of charts and tables. The underlying assumptions were set out in the introduction. To recap briefly, the models assume a full-career worker retiring at the normal pensionable age under the parameters of today's pension system (including the full effect of any reforms legislated).

104. The first set of charts, Figure 1, shows the value of pension benefits as a proportion of economy-wide average earnings. These are presented for people earning various levels of the economy-wide average, ranging from 0.3 to five times the average. (The relatively high upper figure was chosen to exceed the benefit ceilings in all countries. Most workers will of course lie well to the left of the charts.) The charts are to the same scale with the exceptions of Finland, Italy, the Netherlands and Sweden. The absence of a benefit ceiling to mandatory earnings-related means that pension entitlements for higher-income workers are larger than in the other countries. It is important to be aware of these differences in the vertical scale when making cross-country comparisons.

105. The second set of charts, Figure 2, shows the value of pension benefits as a 'replacement rate', that is, as a proportion of the individual's pre-retirement earnings. Here, the vertical scales have all been capped at 100%: in some countries, benefits for low-income workers can exceed pre-retirement earnings.

106. The two measures presented in Figures 1 and 2 respectively are complementary: they reveal different features of the structure of pension benefits. Summary tables give the value of total pension benefits at selected levels of earnings. Again, these are shown relative to economy-wide average earnings and to individual pre-retirement pay.

107. In **Canada**, the basic pension is paid at a flat rate, but withdrawn once earnings reach a particular threshold. The earnings-related pension naturally increases with earnings, but is flat once pay reaches the benefit ceiling, just over economy-wide average earnings. The income-tested component is withdrawn at a lower income level than the basic scheme. However, in the absence of any private pension or investment income (a rather implausible assumption), it is still payable to higher earners. Adding the components together produces an interesting pattern. The value of the total pension at first increases with pay because of the earnings-related pension. Once the pay threshold for the earnings-related scheme is reached, the pension value reaches a plateau. Then the withdrawal of the basic pension kicks in. Once the basic pension is exhausted, the overall pension is flat, worth 30% of economy-wide average earnings.

108. Looking at the pension value as a replacement rate (Figure 2), the means-tested and basic pensions together produce a rapidly declining replacement rate as earnings increase. The earnings-related pension offers a flat, 25-per-cent replacement rate at first, but the replacement rate declines once the earnings threshold is reached. Adding the components together, the Canadian public-pension system is highly progressive, paying much higher replacement rates to low-income than to high-income workers.

Indeed, replacement rates for the highest-income workers are below 10%. Overall, the curve is very close to a rectangular hyperbola, reflecting the fact that the system as a whole pays a broadly constant benefit at different earnings levels.

109. In **Finland**, the income-tested pension is exhausted at three-quarters of average earnings and only earnings-related pension benefits are received above that level of earnings. This means that the picture is much simpler than Canada, for example. The absence of a ceiling to pension benefits and pensionable earnings means that the value of the pension continues to grow across the earnings range. The contrast with the Canadian system is also clear from the individual replacement rates. The income-tested pension boosts the replacement rate at lower level of earnings, but above the threshold of three-quarters of average pay, benefits are flat at 60% of individual earnings. The overall benefit structure is progressive because of the additional income-tested pension paid to people with the lowest incomes.

110. With a single pillar, the public pension in **Germany** is somewhat simpler to model than two-tier public systems, such as those in Canada and Finland. Nevertheless, the boost to pensionable pay of the lowest workers in the benefit formula gives the public pension a progressive formula. Up to half of average earnings, pensionable pay is increased to 1½ times its actual level. However, beyond this threshold there is a plateau, because the rules prohibit an increase in pensionable pay beyond three-quarters of the average. Unlike the Finnish system, the German scheme has a ceiling to pensionable earnings, which means that the value of the pension is flat once earnings reach around one-and-three-quarter times the economy-wide average. Note that the pension entitlement at 30% of average earnings is sufficient to preclude entitlement to social assistance. The addition to pensionable pay for lower-income workers results in a higher replacement rate against individual earnings (Figure 2). The curve flattens out once earnings reach three-quarters of the average and the individual is longer entitled to this supplement. The replacement rate then declines once earnings exceed the benefit ceiling.

111. The pension values shown here are below those typically reported in national studies of Germany. This is because of the treatment of pre-retirement indexation of earnings in the defined benefit formula. In most other countries, earlier years' earnings are uprated in line with economy-wide gross pay. In Germany, this indexation is effectively to net wages. Since contribution rates for the pension scheme are forecast to rise substantially in the future, the modelling assumes that net wages grow at 1.5% a year, slower than the 2% a year growth assumed for gross earnings. The overall effect is that replacement rates are around 85% of the value that they would be with indexation to gross earnings.

As in Germany, the new public pension system in **Italy** has just a single tier. Pension benefits at lower earnings are zero, because of the relatively high minimum applied both to contributions and benefits. Then there is a jump, because contributions are levied and benefits are paid in respect of the whole of earnings once pay reaches the threshold. At the other end of the salary scale, the pension ceiling — at 365% of economy-wide average earnings — is also higher than limits in other countries. Indeed, the pattern of pension level with earnings is much closer to systems without ceilings — Finland, the Netherlands and Sweden — than it is to other countries with benefit limits. The relatively high floor to pension contributions means that the very lowest earners considered on the chart depend on social assistance for their income. The social assistance level is, however, below the pension that would be earned for a full career of contributions at the contribution floor. This results in a jump in the value of total benefits at the floor.

112. The pattern of the individual replacement rate against earnings is also rather different from other countries. There is a zero replacement rate from the public pension at the lowest levels of earnings. However, social assistance ensures a minimum total benefit for the lowest income groups. Since this is set at an absolute level, the replacement rate declines until the contribution floor of the notional-accounts system is reached. The relatively high earnings ceiling also means high replacement rates at higher levels

of pay. The strengthening of the relationship between contributions and benefits in the new notional accounts scheme results in a less progressive structure of benefits than in countries with large basic, flat-rate or means-tested public programmes.

Figure 1. Mandatory pension benefits as a proportion of economy-wide average earnings by individual earnings, nine countries

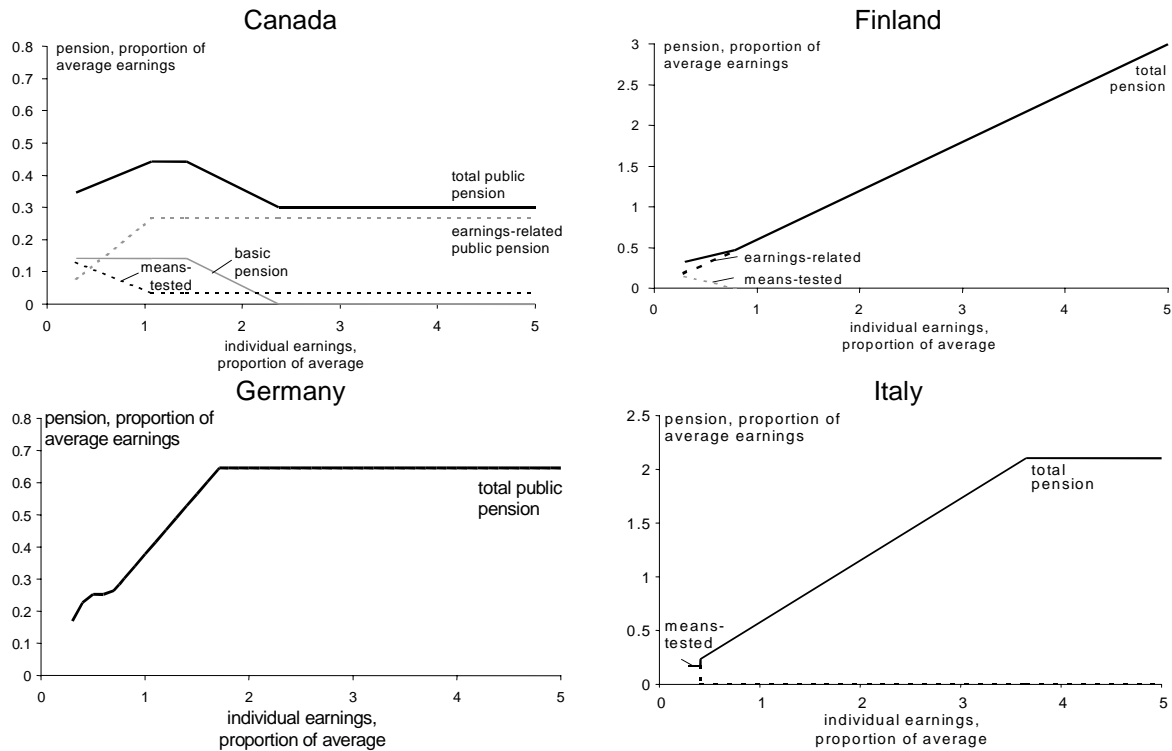
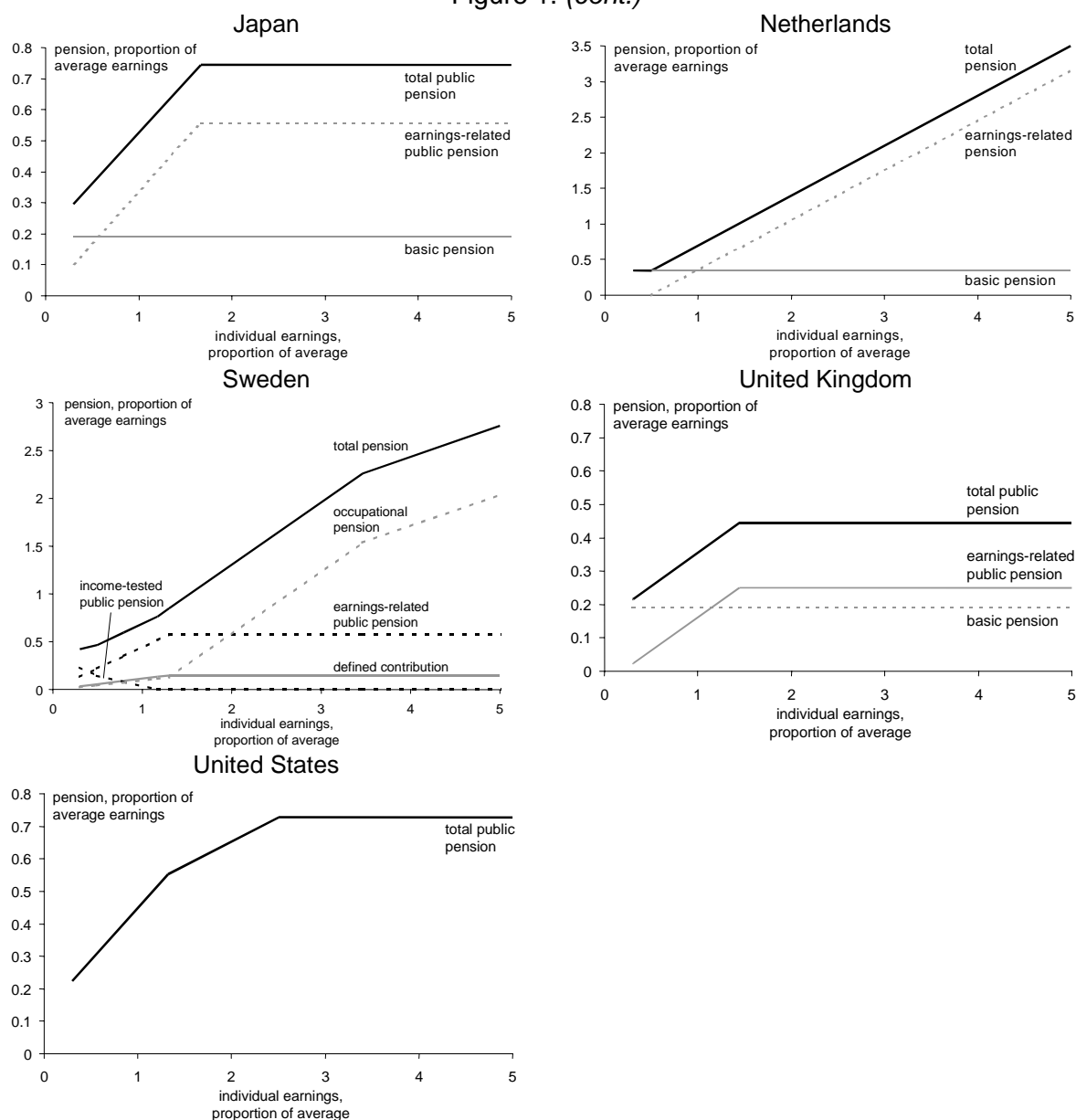


Figure 1. (cont.)



113. At the lowest income levels in **Japan**, most of the total pension benefit comes from the basic scheme. But beyond three-quarters of average earnings, the earnings-related pension dominates. There is, however, a ceiling to earnings-related pensions which caps pension benefits for people earning above 170% of the economy-wide average. The progressivity of this two-tier pension system by the individual replacement rates relative to pre-retirement pay in the second set of charts. The flat-rate nature of the basic pension means that the total replacement rate declines sharply at first. The earnings-related pension, which pays a flat replacement rate up to a ceiling, offset this effect, until the threshold is reached. After this point, the decline in the replacement rate with pay accelerates again.

114. The picture for the **Netherlands** is relatively simple: the total pension is simply the basic scheme plus an earnings-related top-up. The integration of the basic and the earnings-related scheme means that the earnings-related pension nothing to the lowest-income workers. Unlike most of the nine countries

examined in this report, there is no ceiling either to pension benefits or to pensionable pay under the quasi-mandatory occupational plans. Note that the model assumes that the individual remains in a single employer scheme throughout his or her working life. We will shortly return to the issue of pension portability.

115. The Dutch system overall is mildly progressive. Replacement rates are higher at low earnings because of the basic pension. At higher earnings, the basic and earnings-related pension replacement rates are the mirror image of one another, due to the integration procedure. So all workers with pay above half the economy-wide average receive a flat 70% replacement rate.

116. The mandatory pension scheme in **Sweden** has four different elements. The earnings-related and defined contribution pensions are proportional up to the contribution ceiling. Hence, the curves in the first chart begin as rays from the origin. The earnings-related pension is much larger than the defined contribution pension, because it receives contributions of 16%, compared with 2.5% paid into individual pension accounts. Working in the opposite direction, the model assumes that the rate of return credited to the notional accounts (earnings growth) is below the rate of return on investments in the funded defined contribution plan.

117. Low-income workers receive an income-tested benefit in retirement. This has two different withdrawal rates against income from the public earnings-related pension. This is apparent in the kink in the total pension curve at around half-average earnings. The analysis of the individual replacement rate confirms the strongly progressive role of this benefit. The funded defined contribution and earnings-related pension pay the same replacement rate at earnings up to the ceiling, but the means-tested guarantee pension gives a substantial boost to low-income workers' retirement incomes.

118. At higher earnings levels, occupational pensions are the main source of income. The chart is based on the ITP scheme, which applies to white-collar workers. The ceiling for this scheme — 5.2 times average earnings — is a little off the horizontal scale. However, the switch from a 65-per-cent replacement rate to one of 32.5% at 3.5 times average earnings is apparent in both charts.

119. Means-tested benefits play a very important role in providing retirement incomes in the **United Kingdom**: 37% of pensioner income units were entitled to means-tested support in 1997-98. However, a full-career worker earning 30% of the economy-wide average would just fail to be entitled to the main means-tested benefit, known as income support. The basic pension pays a flat 20% of economy-wide pay to workers of all income levels. The earnings-related pension pays 20% of earnings above a floor. But there is quite a low ceiling to pensionable pay of 1½ times average earnings. Total benefits are therefore flat beyond this ceiling. The progressivity of this system is highlighted by the individual replacement rate in the second set of charts. The basic pension delivers quite high replacement rates to low earners, and the relatively low ceiling to pension benefits means that the earnings-related scheme is progressive across much of the earnings scale.

120. The public pension scheme in the **United States** is progressive because of the schedule of different replacement rates. The same effect is achieved by having a multi-tier public pension in most of the other countries analysed: Canada, Finland, Japan, the Netherlands, Sweden and the United Kingdom. Only Germany has a similar progressive formula for its public pension.

121. Although it is difficult to make out the 90% rate applied to the lowest band of earnings (because it is close to the beginning of the curve), the shift from 32 to 15% produces a clear kink. Maximum pensionable earnings are around 2½ times the economy-wide average. The result is a progressive benefit structure, with a monotonic decline in the individual replacement rate with earnings. The ceiling on pensionable pay, as elsewhere, also has an important effect. The social assistance benefit, supplemental

security income, is set at a level lower than the public pension entitlement of a worker with a full career on 30% of average earnings. However, some states' additions would be payable to lower-earners in these circumstances. California's supplement, for example, would boost the total income of pensioners who had earned less than 50% of average from around 20% of economy-wide average earnings to nearly 29%.

Figure 2. **Mandatory pension benefits as a proportion of individual pre-retirement earnings, nine countries**

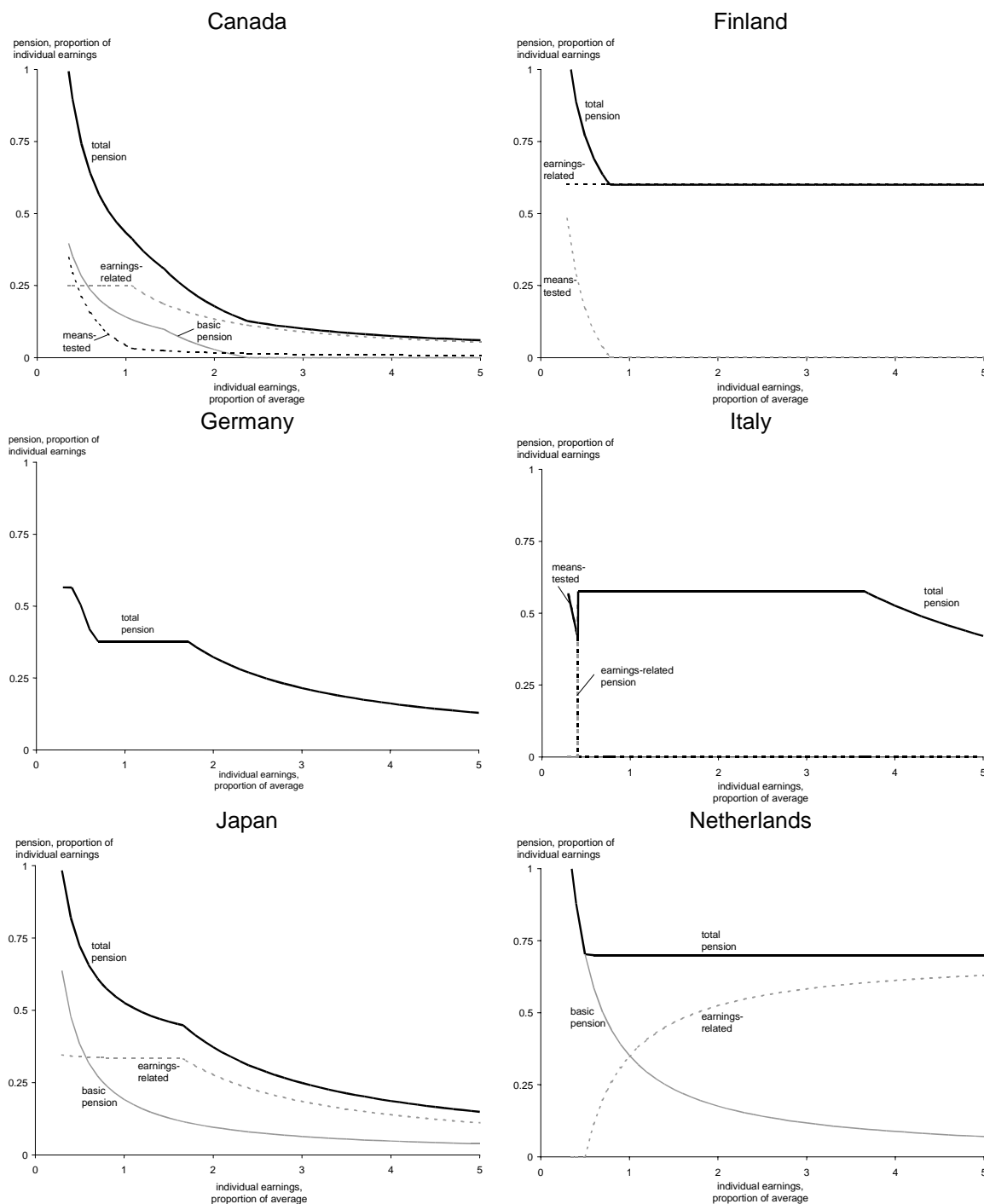
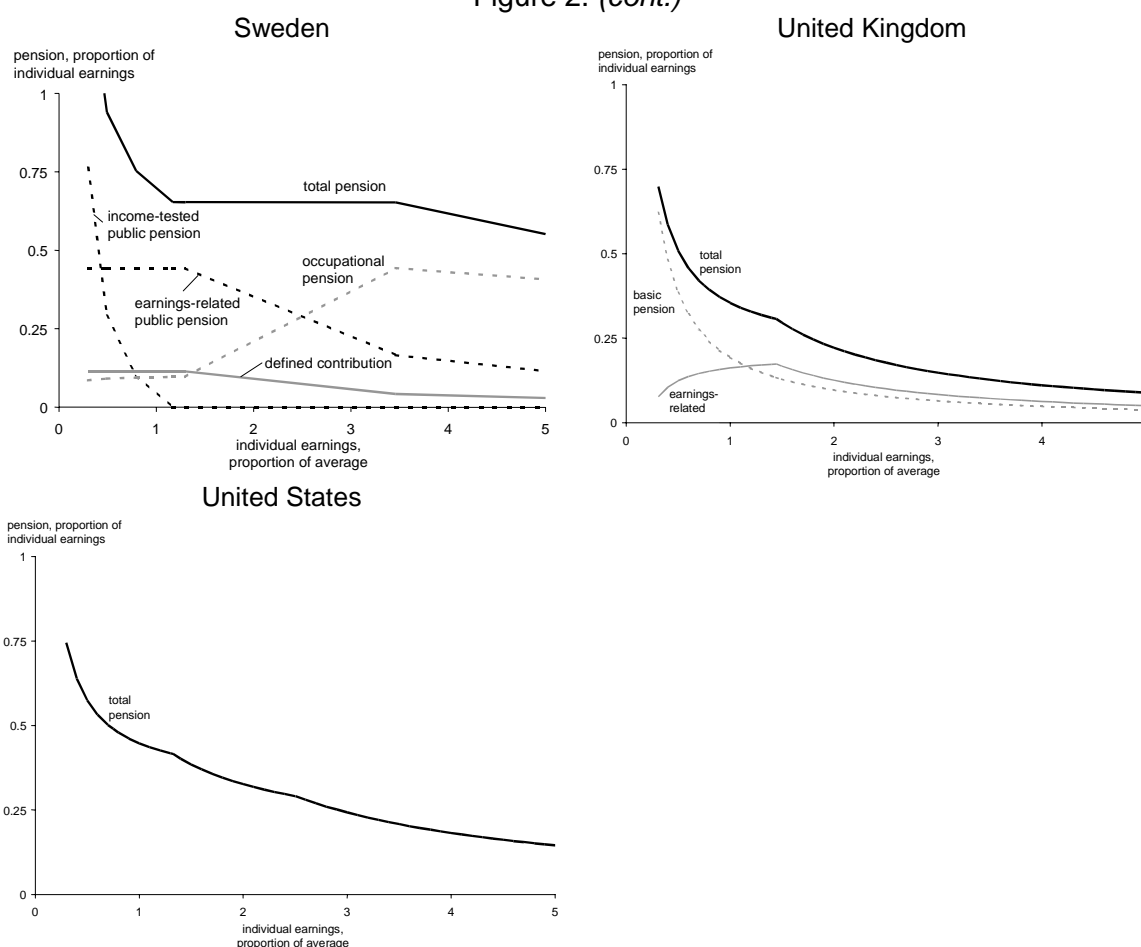


Figure 2. (cont.)



122. Table 7 compares the results from the charts of pension benefits (relative to economy-wide average earnings) at different levels of pay, given in Figure 1 above. The columns show different proportions of average earnings, ranging from one half to five times.

Table 7. Total mandatory pension benefits as a percentage of economy-wide average earnings at different proportions of average earnings

	<i>Individual earnings, proportion of economy-wide average</i>						
	<i>0.5</i>	<i>0.75</i>	<i>1</i>	<i>1.5</i>	<i>2</i>	<i>2.5</i>	<i>5</i>
Canada	37	40	43	43	36	30	30
Finland	38	46	60	90	120	150	300
Germany	25	28	38	57	65	65	65
Italy	36	54	72	109	145	181	264
Japan	36	44	53	69	75	75	75
Netherlands	35	53	70	105	140	175	350
Sweden	47	57	69	98	131	163	276
United Kingdom	25	30	35	44	44	44	44
United States	29	37	45	58	65	73	73

123. The paper has already discussed the patterns in each country in detail. However, it is worth now drawing out the different patterns between particular countries. They divide into two broad groups. The first — consisting of Canada, Germany, Japan, the United Kingdom and the United States — has ceilings to pensionable pay and/or to pension benefits in the mandatory system. The second group has either no ceiling — Finland and the Netherlands— or a very high ceiling — Sweden and Italy. At low levels of earnings, these countries pay broadly similar levels of benefits to the countries with relatively low pension maxima. But at high levels of earnings, benefits are constant in the first group, but continue to grow in the other four countries.

124. These ceilings are therefore an important variable in explaining the structure of pension benefits in different countries. They probably deserve more prominence in the analysis of countries' retirement-income systems than they generally receive. Table 8 shows maximum pensionable earnings as a proportion of average pay. It also gives the maximum pension benefits that a full-career worker can earn. All countries have an earnings-related pension scheme of some sort, which means that the maximum pension benefit is generally earned by high-income workers. The exception is Canada, because of the claw-back of the basic pension from higher-income pensioners.

Table 8. Maximum pensionable earnings and maximum pension benefits, percentage of economy-wide average earnings

<i>per cent of average earnings</i>	<i>Maximum earnings</i>	<i>Maximum benefits</i>
Canada	107	44
United Kingdom	144	44
Japan	167	75
Germany	171	50
United States	250	73
Italy	365	135
Sweden	520	282
Finland	—	—
Netherlands	—	—

Note: maximum pensionable earnings in the Swedish public scheme are 130% of average earnings and maximum pension benefits are 72% of average earnings

125. Table 9 shows the pension as a replacement rate, relative to individual earnings. Table 7, in contrast, showed its level relative to economy-wide average earnings. Thus, Table 9 corresponds with Figure 2, whereas Table 7 corresponds with the results in Figure 1. This table confirms the pattern of the previous analysis: particularly the distinction between countries with relatively low ceilings to pensionable pay and those with no maximum or a very high one. This, as discussed in more detail below, reflects a fundamental difference in philosophy between different countries' mandatory pension regimes. Countries with high ceilings provide comprehensive retirement-income insurance through the mandatory system. They aim to give all workers, including those with high incomes, a retirement income that is a high proportion of pre-retirement earnings. At the other end of the spectrum are countries such as Canada and the United Kingdom. Although both have an earnings-related scheme, these are on a much smaller scale. Thus, their mandatory regimes are focused more on redistribution: ensuring that all pensioners meet a reasonable minimum income standard. This had led to the development of voluntary private provision to perform the insurance role for higher-income workers.

Table 9. **Total mandatory pension benefits as a percentage of individual earnings at different proportions of average earnings**

	<i>Individual earnings, proportion of economy-wide average</i>						
	<i>0.5</i>	<i>0.75</i>	<i>1</i>	<i>1.5</i>	<i>2</i>	<i>2.5</i>	<i>5</i>
Canada	74	54	43	29	18	12	6
United Kingdom	51	41	35	30	22	18	9
Germany	50	38	38	38	32	26	13
United States	57	49	45	39	33	29	15
Japan	72	59	53	46	38	30	15
Sweden	93	77	69	66	65	65	55
Italy	58	58	58	58	58	58	42
Finland	77	61	60	60	60	60	60
Netherlands	70	70	70	70	70	70	70

3. Empirical results: net pension benefits

126. Personal income taxes and social security contributions have an important impact on the living standards of older people relative to those of the population as a whole. This section calculates net replacement rates: that is, pension benefits less any income tax and social security contributions due relative to net earnings (again, after income tax and social security contributions).

127. The calculations of net earnings for people in work are based on the tax equations developed by the OECD's Working Party on Tax Policy Analysis and Tax Statistics, and published annually in the *Taxing Wages* report (OECD, 2001). These are also described briefly in a companion paper to this one: Keenay and Whitehouse (2001). The calculations of net incomes for pensioners are based on amended versions of these equations, which include the effect of concessions offered to pensioners. Detailed descriptions of the nine countries' systems and the calculations can be found in Keenay and Whitehouse (2001 and forthcoming).

128. The overall effective tax rate on people during retirement is lower than when they were working for three main reasons. First, tax systems are progressive and over most of the income range, the gross replacement rate is less than 100%. Secondly, social security contributions are typically levied only on earnings and not on pension benefits. Where pensioners are liable for social security contributions, these are usually levied at a lower rate than on people of working age. Finally, many countries have additional concessions to pensioners in their personal income tax. These are summarised in Table 10.

129. These last two effects are isolated in the companion papers (Keenay and Whitehouse, 2001, forthcoming), which look at the average effective tax rate paid by workers and pensioners at the same income level. These can be up to 25 percentage points lower for older people than they are for people of working age. The overall impact of the tax system — including the effect of the general progressivity of the income tax — can be seen by comparing gross and net replacement rates at different levels of income.

130. Figure 3 shows gross and net replacement rates for the nine countries. Again, the charts show these measures for earnings between 0.3 and five times the economy-wide average, capped at 100%. The gross replacement rate is simply the total pension line from Figure 2. The net replacement rate compares net pension with net earnings.

Table 10. Summary of concessions to older people in personal income tax systems

<i>Country</i>	<i>Concession</i>	<i>Parameters</i>
Canada	Age credit	Credit of 16% to maximum of nearly \$3 600 Withdrawn at 15% rate between approximately \$27 000 and \$51 000
	Private pension/annuity income	Credit of 16% on first \$1 000
	Guaranteed income supplement	No tax on this income-tested benefit
Finland	Age deduction: local income tax	Allowances of around FM34 000 for a single person and around FM29 000 for each partner in a couple
	Age deduction: central government income tax	Allowance of FM23 000 Both allowances withdrawn at 70% by amount which pension exceeds the deduction
Germany	Private pension income	40% of benefit not taxable up to ceilings (DM6 000 for occupational plans, DM3 700 for personal schemes)
	Public pension income	Age-varying proportion of public benefit not taxable: e.g., only 32% taxable at age 60, 27% at age 65 and 21% at age 70
Italy	Age credit	Extra L120 000 if only pension income and it does not exceed L18m
	Private pension income	12.5% of occupational pension benefits not taxable; 40% with personal pension
Japan	Deductibility of income from public pension and tax-qualified retirement plans	100% deduction of first ¥1m for over 65s, 25% up to ¥3.6m, 15% up to ¥7.2m and 5% thereafter; minimum deduction of ¥1.4m
	Old-age tax deduction	¥0.5m additional deduction if total gross income under ¥10m
Netherlands	Age deduction	Additional allowance of around NLG500; increased to NLG2 200 for incomes under NLG57 000
	Pensioner deduction	Additional allowance for recipients of basic pension; worth NLG500 or NLG3 100 for low-income pensioners
Sweden	Age deduction	Varies between SKr8 700 and SKr56 000 depending on pension income
United Kingdom	Age deduction	Additional deduction between around £1 400 and £1 600 depending on age; withdrawn at 50% above <i>circa</i> £17 000
United States	Age deduction	Additional deduction of around \$1 000 for a single person
	Tax credit	Up to \$1 125; withdrawn once total income exceeds \$17 500 or untaxed public pension exceeds \$5 000
	Social security relief	Between 15% and 50% of social security income is not taxed, depending on total income

Note: values have been rounded for simplicity. See Keenay and Whitehouse (2001 and forthcoming) for a detailed description

131. At the earnings of the average production worker, the net replacement rate is 13 percentage points higher than the gross, averaging across the nine countries. Outliers are the Netherlands, where the difference is 22 points, and Canada and the United States (16 points). At the other end of the spectrum, the difference between net and gross levels in Finland (six points), Sweden and Japan (both eight points) are particularly small. The explanation for the differences between countries is complex. For example, the absolute difference in the Netherlands is large across most of the income range because the Dutch quasi-mandatory occupational pensions pay the highest replacement rate among the nine countries. In Canada and the United States, the large difference reflects the value of additional tax concessions given to older people. The small differences in Finland and Sweden are because tax concessions are withdrawn from middle- and higher-income pensioners. In Japan, both workers and pensioners face a very low direct tax burden by the standards of other OECD countries.

132. Figure 4 shows gross and net pensions as a proportion of economy-wide average earnings. This chart corresponds to the gross results in Figure 1 (while Figure 3 corresponds with Figure 2). Again, the charts cover the earnings range from 0.3 to five times the average. The charts for countries without ceilings to pension benefits (or a very high ceiling) are capped at three times average earnings. In Figure 3, net replacement rates were higher than gross replacement rates for the three reasons set out above. In Figure 4, the grey, dotted lines (the same as the total pension data in Figure 1) show the ratio of gross pension entitlement to economy-wide gross average earnings. The black, solid line shows the net pension entitlement divided economy-wide net average earnings. In the countries without ceilings or with high ceilings to pensionable pay, the net pension can fall below the gross pension as a proportion of economy-wide average earnings. This is because the average effective tax rate on higher-income pensioners can exceed that paid by the average production worker.

Figure 3. **Gross and net replacement rates**

Mandatory pension benefits as a proportion of individual pre-retirement earnings before and after income tax and social security contributions, nine countries

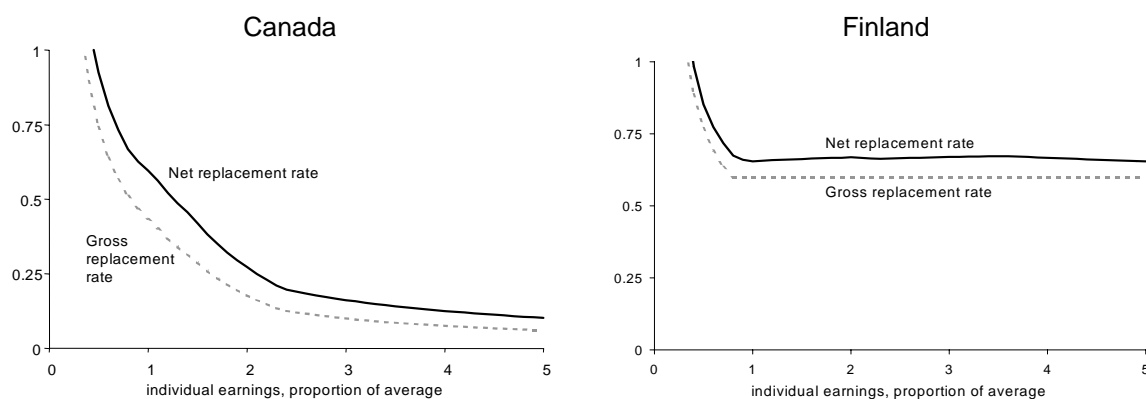


Figure 3 (cont.)

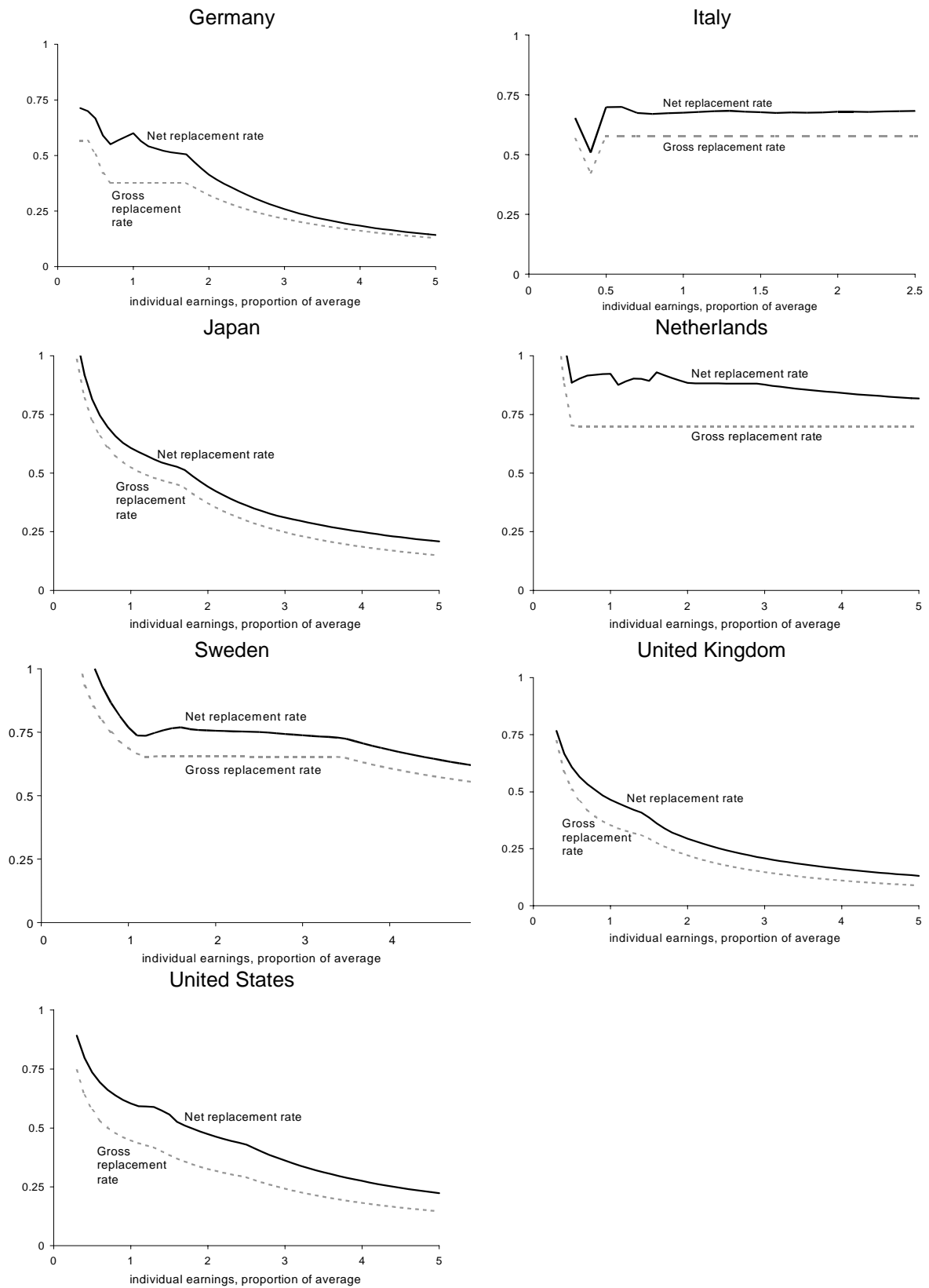


Figure 4. **Gross and net pension values by earnings**

Mandatory pension benefits as a proportion of economy-wide earnings before and after income tax and social security contributions, nine countries

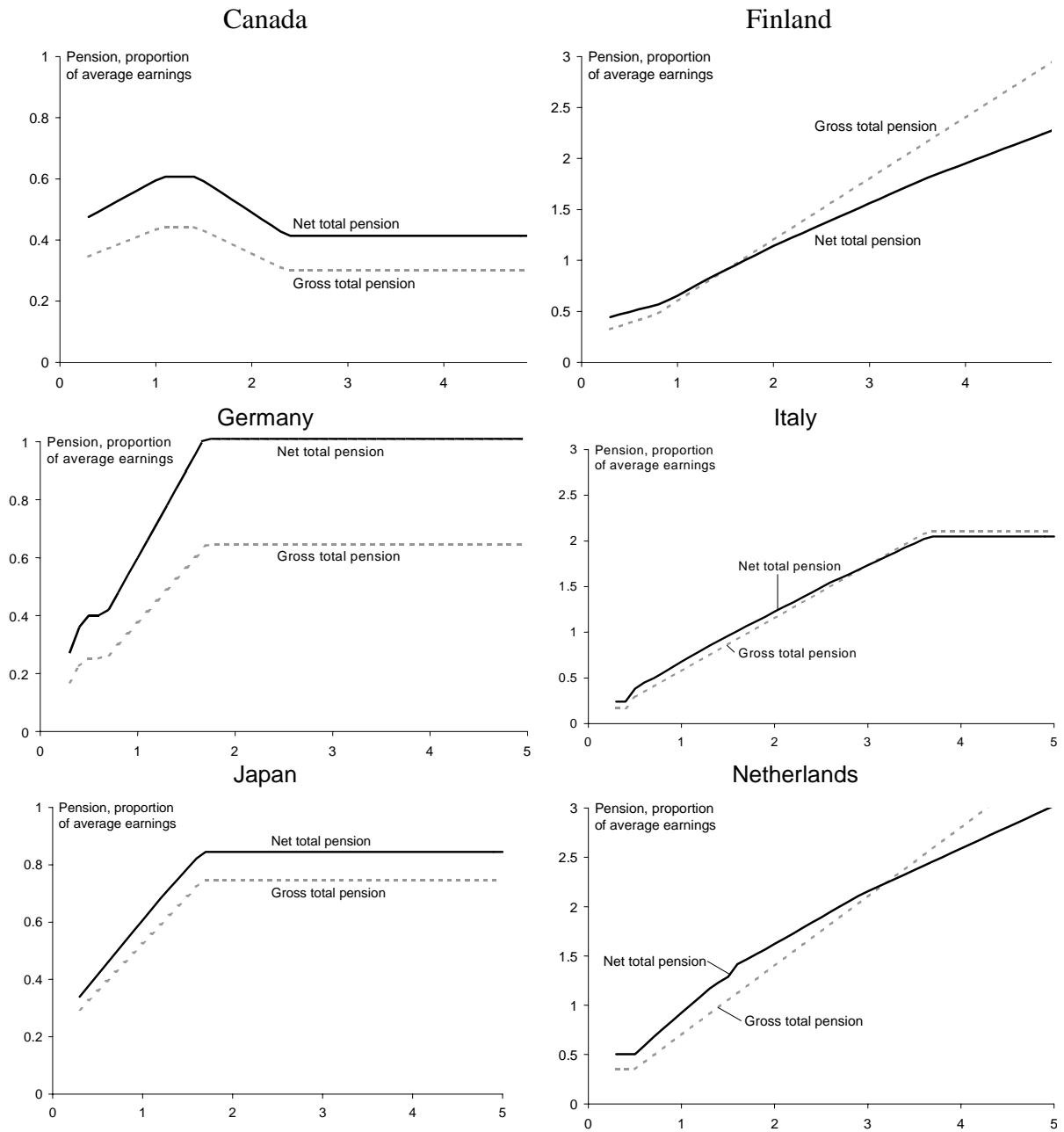
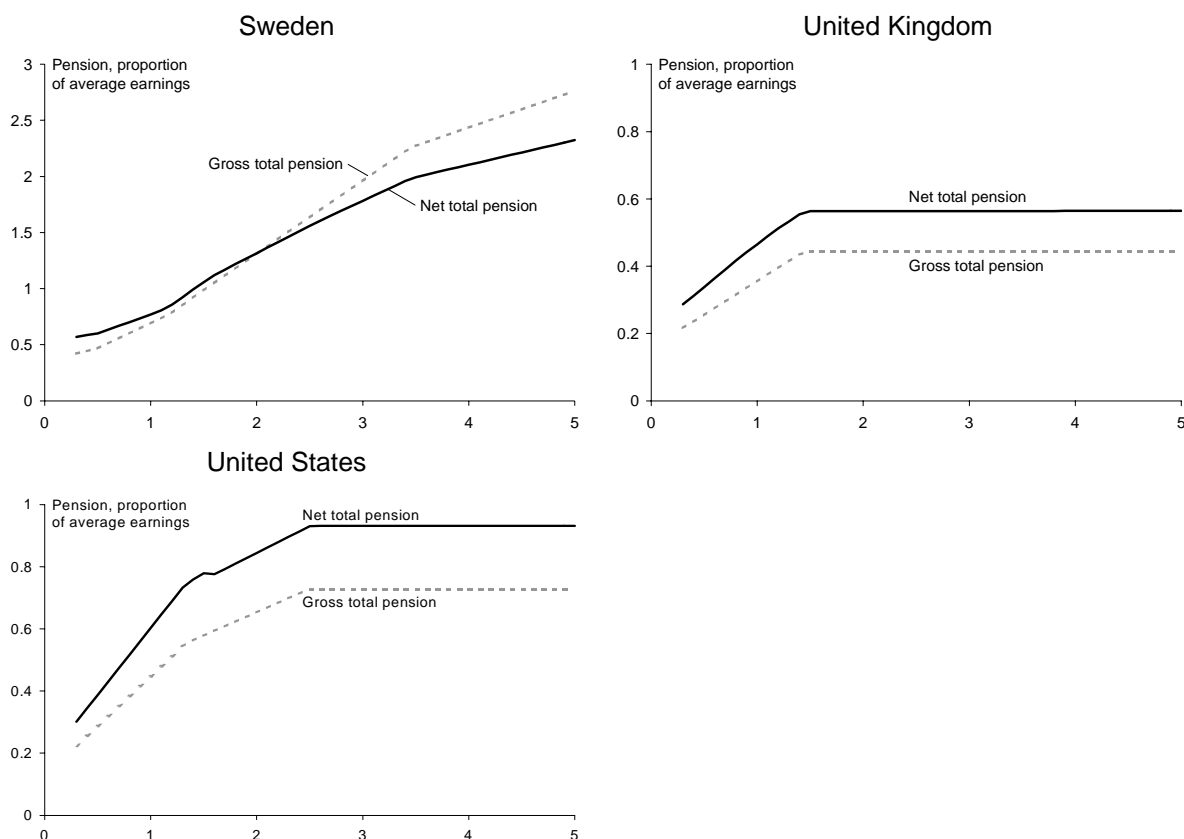


Figure 4 (cont.)



4. Voluntary private pensions

133. Voluntary occupational pension schemes are discussed separately from public and statutory quasi-mandatory private schemes because of the complex issues they raise.

134. In the absence of detailed data on the benefit formulae of occupational schemes in Germany and Japan, this section focuses on Canada, the United Kingdom and the United States. As Tables 11 and 12 show, the proportion of the elderly with income from employer-provided pensions is much higher in the three Anglo-Saxon countries than in Germany or Japan, even though coverage of the workforce is similar. (The small proportion in Japan receiving an occupational pension income is probably explained by the fact that most schemes pay out a lump sum rather than an income stream. In Germany, the explanation is most likely to be the long vesting periods in occupational plans, which mean that many people leave covered jobs before establishing a pension entitlement.)

135. In contrast, occupational pension schemes in Finland are statutory. In the Netherlands and Sweden, they achieve near universal coverage through industrial-relations agreements at the industry and national level respectively. Occupational schemes in these countries were discussed along with mandatory

public pension schemes above. Table 12 gives data on the proportion of workers covered by occupational plans for all nine of the countries surveyed here.³⁸

Table 11. Percentage of pensioners with income from employer-provided pensions and percentage of workers covered by occupational pension plans, late 1990s

<i>per cent</i>	<i>Percentage of pensioners with occupational pension income</i>			<i>Percentage of workers covered by occupational pension plans</i>		
	<i>All</i>	<i>Men</i>	<i>Women</i>	<i>All</i>	<i>Men</i>	<i>Women</i>
Canada	41	54	31	45	52	36
Germany	—	21	9	45	—	—
Japan	10	—	—	47	—	—
Netherlands	50	76	23	90	—	—
United Kingdom	49	66	32	47	58	41
United States	36	48	26	44	48	38

Source: Johnson (1998), Table 3.1; United Kingdom *General Household Survey* data; United States Department of Labor (1999)

Table 12. Percentage of workers covered by occupational pension plans

	<i>Percentage of workers</i>
Canada	33
Finland	100/15
Germany	46
Italy	5
Japan	50
Netherlands	91
Sweden	90
United Kingdom	46
United States	45

Note: statutory plans achieve 100% coverage in Finland; the 15% figure relates to additional, voluntary provision by employers

Source: OECD (2001), Table 6.2

4.1 Modelling occupational pension values

136. One difficulty in modelling voluntary occupational schemes is that their terms and conditions differ. Indeed, there are no comprehensive data for Germany and Japan on the rules of occupational schemes. However, in Canada, the United Kingdom and the United States, there are regular, detailed surveys of the benefit formula occupational plans.

137. Table 13 shows the parameters chosen for the modelling. These are, where possible, 'typical' and the approximate proportion of members covered by particular provisions are shown in parentheses where available. More detailed analysis of these parameters is provided in the relevant country chapter.

38 The data are broadly comparable between the two sources, except for occupational pension coverage in Canada. It has not been possible to determine the reason for the difference.

Table 13. Features of model defined benefit occupational pensions in Canada, the United Kingdom and the United States

	<i>Canada</i>	<i>United Kingdom</i>	<i>United States</i>
Earnings measure	Final salary (70%)	Final salary (95%)	Final salary (55%)
Vesting	5 years' service	2 years' service	5 years' service
Pension age	65	65	65 (47%)
Accrual rate	2% a year (70%)	1.25% a year (65%)	1.5% a year
Integration method	1.3% accrual up to public benefit ceiling	Deduct value of basic state pension (12%)	Lower accrual rate on earnings covered by public benefit
Pre-retirement indexation	None	Price inflation	None
Post-retirement indexation	Half price inflation	Price inflation	None

138. Occupational pensions differ from public-sector schemes in that the benefit formula depends on some measure of 'final' earnings rather than average pay. The latter is more common in public programmes (at least in OECD countries: Disney and Whitehouse, 1999, Tables 1 and 2). Moreover, public-sector plans with final-salary formulae are based on pre-retirement pay, while occupational pension benefits are based on the final salary in a particular scheme. So the benefits of someone leaving a plan at age 40 — known as an 'early leaver' — are based on earnings at that age, not pay immediately before retirement. This, as the following sections show, has important implications for the value of pension benefits.

4.2 *United Kingdom*

139. A series of regulatory changes since the mid-1970s have improved the protection of pension rights of early leavers. Since 1990, pension rights that are 'preserved' in a scheme when an employee moves must be uprated in line with inflation up to a ceiling of 5%. (A preserved pension is when employees retain their rights to an annuity in their former employer's scheme, as opposed to a transfer, when the present value of the pension is moved to a new occupational or personal plan. Return of pension contributions as a lump sum was common until this practice was forbidden in the 1970s.)

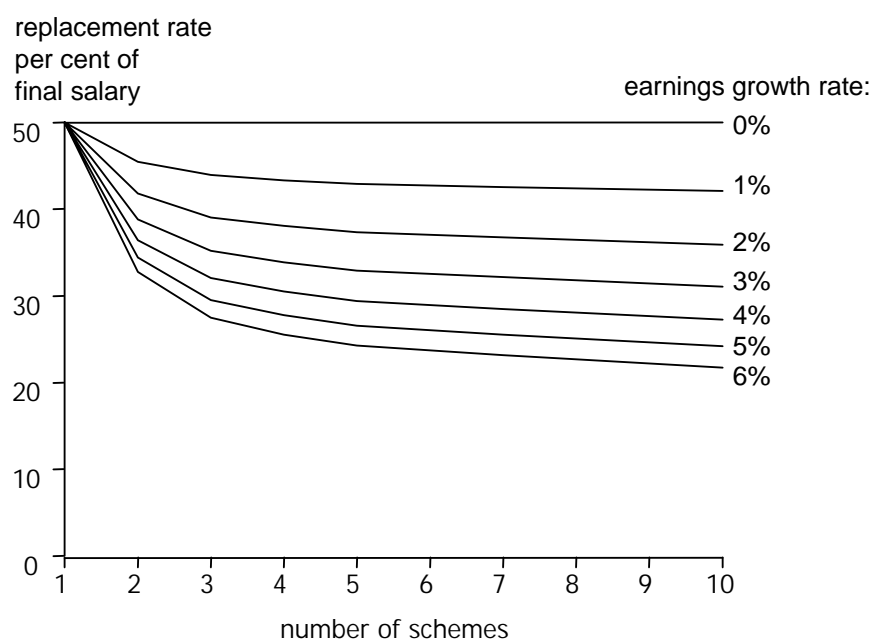
140. If a worker were to spend a full 40-year career in the model scheme, he or she would receive a pension of one half ($^{40}/_{80}$ ths) of final, pre-retirement salary. People who spend 20 years in two schemes would get a quarter of final salary from the second scheme plus a quarter of their salary in the last year of the first job from the first scheme. The relevant measure of earnings for the first scheme is their real salary, because this must now be uprated in line with price inflation (to the five-per-cent ceiling) to retirement. So if people's real earnings continue to grow in their second job, then the pension from their first scheme will be less than a quarter of 'final' salary, *i.e.*, their pay immediately before retirement. The degree of loss depends on how fast individual earnings grow.

141. Figure 5 illustrates this effect for a range of different earnings-growth assumptions and for a series of equal-length tenures in different plans. If their real earnings were to grow at 1%, the pension replacement rate falls from one half of final salary for people who joined one scheme to 45% for people

who spent equal time in two plans. The replacement rate falls with faster increases in earnings: to less than 40% with 3% earnings growth and just one third with 6% earnings growth.

142. Working across the figure, the more schemes the individual joins, the lower the replacement rate at any positive rate of earnings growth. For example, if someone spent eight years each in five different plans, the replacement rate falls to under a third with three-per-cent earnings growth and to less than a quarter with six-per-cent earnings increases.

Figure 5. **Pension replacement rate as a percentage of final salary by number of schemes joined and rate of individual earnings growth, United Kingdom**



143. The analysis in Figure 5 raises two questions. First, how often do people move between jobs and different pension plans? Secondly, how fast do individual earnings grow over the working life?

144. The United Kingdom government's view on the first question is that an increasingly flexible labour market has led to a more mobile workforce which 'render[s] the traditional occupational pension structure obsolescent or inappropriate for major sections of the workforce'.³⁹ The National Association of Pension Funds (a club for mainly large, mainly defined benefit occupational schemes) has attacked this view vociferously. The association describes the government's position as 'based on flawed analysis and interpretation of the scale and nature of changes in employment patterns during the last two decades'.⁴⁰ Average job tenure, according to the association's study (Meadows, 1999), has changed little over the past 20 years: down to five years six months from six years one month in 1975. 'The idea that in the past many people had a "job for life" with a single employer is a myth', the association said. This result is confirmed by the Department of Social Security's Retirement Survey, which collected full labour-market histories from people aged 55-69 in 1988-89. These showed that men had eight jobs on average over their working

39 Department of Social Security (1998a).

40 National Association of Pension Funds (1999): see also Timmins (1999b).

life, lasting an average of seven years one month. Women had slightly over five jobs lasting and average of five years two months.⁴¹

145. Cross-section studies (for example, Disney and Whitehouse, 1991) of age-earnings profiles generally show an inverted-U shape, with real earnings falling at older ages. The pattern varies with occupation. The pay of professional, and to a lesser extent, managerial workers rises steeply with age initially. Professional earnings flatten when workers reach their mid-50s, with an earlier peak for managers. In contrast, the profiles for manual workers are much flatter and peak earlier, in the early to mid-40s. The decline in earnings after their peak is also relatively larger, so that workers from their late 50s onwards earn the same or less than workers in their 20s. However, cross-section analysis conflates age and cohort effects. For example, the pay of 50-year-olds today might tell us something about the pay of today's 40-year-olds when they are 50. But these cohorts will differ in many important attributes that will affect pay: education, training, labour-market experience *etc.* Following the same cohort over time, other studies have found that age-earnings are broadly linear, with pay continuing to rise even at older ages.⁴² These studies suggest a 2-2.5% annual increase for manual workers and 5% for professionals over the working life.

146. Putting these analyses together suggests a high cost to most workers from lack of portability of occupational pension benefits. Average tenure of five-to-six years suggests that people would join seven or eight schemes with a career fully covered by occupational plans. Professional workers might expect a replacement rate of around a third and manual workers around 45% with that rate of job change. If the pattern of job tenure is broadly similar today as it was 20 years ago, then occupational pensions, which reward those with 'a job for life', have never been appropriate for the majority of the workforce.

147. This result is borne out by the low level of occupational pensions in payment compared with earnings. The average occupational pension in 1997-98 (among the 60% of pensioners with some income from this source) was 27% of economy-wide average earnings.⁴³ Unfortunately, we do not yet have panel data of sufficient length to analyse individual replacement rates. But this statistic gives a broad indication of average replacement rates. Its low level is indicative in part of the fact that few people spend their whole working lives covered by occupational schemes and in part of the cost of lack of portability.

148. Figure 6 shows how occupational pensions affect total pension benefits (compare Figure 1). The occupational pension scheme member foregoes his or her entitlement to the public earnings-related pension, Serps, but is still entitled to the basic pension. The value of the occupational pension is proportional: the curve is a ray through the origin. This curve is also the value of the total pension in the model, integrated scheme, which deducts the value of the basic pension from the total benefit.⁴⁴ Note that the modelling assumes that the individual spends eight years each in five different occupational pension schemes. Membership of fewer schemes across the career would result in a higher benefit, as Figure 5 illustrates.

149. The ceiling on pensionable earnings for occupational benefits, set in the United Kingdom's tax law, was £90 600 in 1998-99. This limit is equivalent to 5.2 times economy-wide average earnings. This is off the scale. So, including occupational pensions, the pattern of benefit receipt by earnings is similar to

41 See Disney, Meghir and Whitehouse (1994) and Johnson, Disney and Stears (1996). The retirement survey is described in Bone *et al.* (1992).

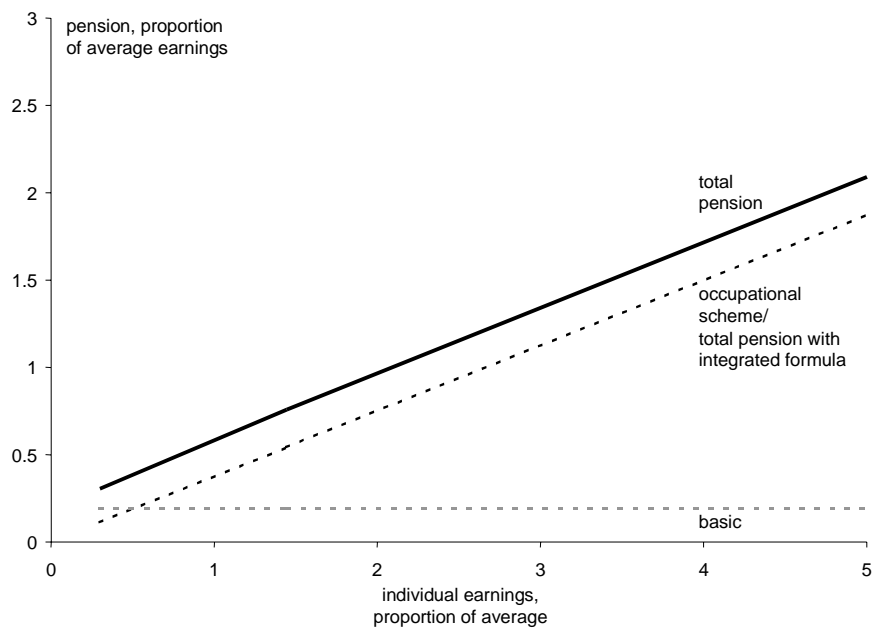
42 See, for example, Meghir and Whitehouse (1996) and Gosling, Machin and Meghir (1998).

43 Department of Social Security (2000), Table 12 shows mean receipt of £92 a week.

44 Some schemes deduct the lower earnings limit for social security contributions, but this, by law, is broadly equivalent to the basic pension.

other countries with uncapped earnings-related pensions: the Finland and the Netherlands. Indeed, the protection for early leavers in the Dutch scheme has many similarities with the United Kingdom's system. However, broad, industry-wide coverage of the Netherlands' schemes means that the issue of pension transfers is probably less significant.

Figure 6. **Value of public and private pension benefits in the United Kingdom, proportion of economy-wide average earnings**



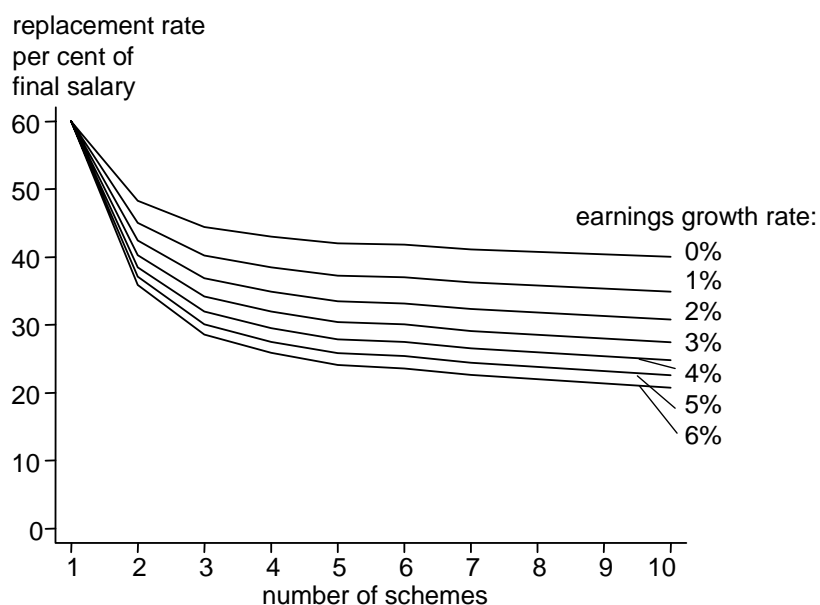
4.3 *United States*

150. While the United Kingdom has introduced protection for price inflation in its occupational pension system both before and after retirement, regulatory attention in the United States has focused on the solvency of occupational pension schemes and on vesting rights. Pension benefits are almost entirely unindexed, both after retirement and, for early leavers, between the point of leaving a job and the point of retirement. Early leavers' pensions are, as a result, much lower relative to their level in the United Kingdom.

151. This is illustrated for a model occupational scheme in the United States in Figure 7. As in Figure 5, it shows the occupational pension replacement rate for individuals joining a different number of occupational schemes of equal tenure throughout their working life. (Note that the observations for people joining ten schemes with four years' tenure each are for illustration only: since most schemes have a five year vesting rule, such people would receive no occupational pension benefit.)

152. The greater cost of moving jobs can be seen clearly by comparing Figures 5 and 7. In the United States model scheme, a full career in an occupational scheme would give a replacement rate of 60%. But joining two schemes for 20 years each would cut this replacement rate to 45%, five schemes for eight years each to just 37%. This assumes inflation of 2.5% a year: an episode of higher inflation would erode the value of preserved or deferred occupational pension rights more rapidly. This assumes individual real earnings grow at just 1% a year. With 3% real earnings growth, these figures are 40% and 30% respectively.

Figure 7. Pension replacement rate as a percentage of final salary by number of schemes joined and rate of individual earnings growth, United States



4.4 Canada

153. Canadian occupational schemes are similarly vulnerable to inflation between the point of leaving a particular plan and the time of retirement. Figure 8 shows the results for the model scheme in Canada. The pattern is the same as in the United States (Figure 7), but accrual rates, and so replacement rates, are typically higher in Canada.

154. Integration of occupational pension benefits is rare in the United Kingdom, but very common in both Canada and the United States. Integration practice in the United States varies substantially, so it is difficult to devise a reasonable 'model' procedure. In Canada, in contrast, the practice of applying a lower, 1.3% accrual rate to earnings below the ceiling for the public, earnings-related benefit is widespread.

155. Figure 9 shows the results of modelling such a scheme. Even at the lowest earnings levels, the retirement income of occupational-scheme members is sufficient to float them off the means-tested supplement. The kink in the schedule for the occupational pension value at the ceiling of the earnings-related pension is readily apparent: here the pension accrual rate shifts from 1.3 to 2% of earnings. As in the United Kingdom, the pattern of total pension entitlement, once occupational schemes are taken into account, is much closer to Finland and the Netherlands.

Figure 8. Pension replacement rate as a percentage of final salary by number of schemes joined and rate of individual earnings growth, Canada

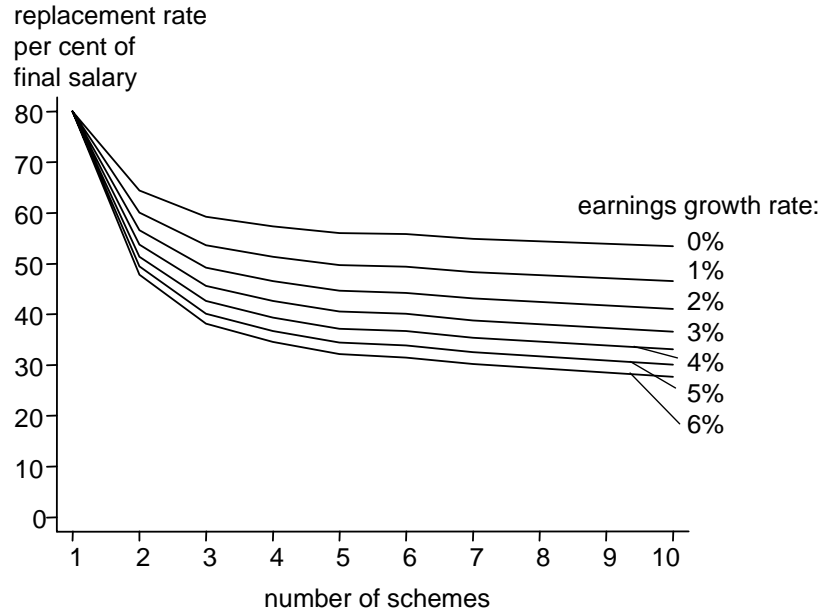
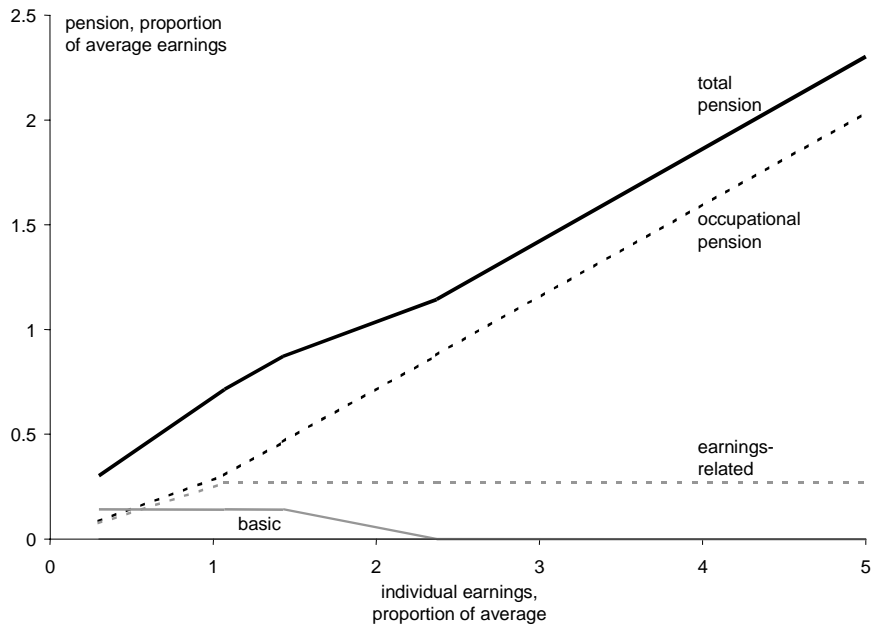


Figure 9. Value of public and private pension benefits in Canada, proportion of economy-wide average earnings



5. Pensions for different family types and additional analyses

156. To simplify the analysis, the calculations in the previous three sections have shown the pension benefits for single people with a full career in employment retiring at the standard pensionable age. This

section describes how systems treat married couples, people with gaps in their work histories and the self-employed. Ongoing work by the OECD's Economics Department and the Directorate for Education, Employment, Labour and Social Affairs is looking at pension benefits for people retiring at different ages. Preliminary results from this work were presented in OECD (2001), Annex 2.

5.1 *Married couples*

157. The pension systems surveyed in this report adopt a number of different approaches to benefits for married couples relative to those for single people. Most earnings-related schemes use the individual as the unit of assessment: the same benefit formula applies to single people and couples alike. The one exception to this among the nine countries is the United States, where social security pays a 50-per-cent dependants' supplement in respect of spouses with no entitlement of their own (or only a small one).

158. The United Kingdom pays a 60-per-cent dependant's supplement in its basic pension system again to couples where one partner has a smaller entitlement of their own. The Netherlands pays a dependant's supplement of 38% of the principal earner's pension. The significance of these dependants' additions has declined due to married women's growing participation in the labour market. This means that most women already earn (or will soon earn) a pension entitlement of their own.

159. Canada's system combines many different elements. The basic pension is an individual entitlement, and the claw-back of the basic pension from higher earners through the tax system is again based on individual income. The means-tested supplement, however, uses the couple as the unit of assessment. The benefit for a couple is 62% higher than that for a single person, and the benefit is withdrawn against individual income rather than the income of the couple. The earnings-related pension is assessed individually with no extra payments for couples.

160. Other resource-tested schemes — such as the United Kingdom's minimum pension guarantee — use the couple as the unit of assessment. Finland's basic pension and Sweden's guarantee pension, however, claw back the benefit on an individual basis not on the pension income of the couple.

5.2 *Gaps in contribution records*

161. There are again many different approaches to the protection of people with gaps in their working history, predominantly, of course, women who interrupt their careers to care for children or elderly relatives.

162. One source of protection is the provision for dependant's additions (in the Netherlands, the United Kingdom and the United States) outlined above. A couple would typically receive extra pension from this source when one partner never worked. However, increases in divorce rates and of never-married lone mothers in many countries weaken the degree of protection afforded by dependant's supplements. The growth in women's participation in the labour market mean that most of those who remain married now spend sufficient time in paid work to earn their own pension entitlement.

163. A second feature of pension systems that helps people with incomplete career histories are universal, basic pension schemes that are based solely (or mainly) on a residency test. Examples are Canada's old-age security and the basic scheme in the Netherlands. Similarly, resource-tested schemes, where they are assessed individually, ensure all pensioners receive a minimum income in their own right whatever their work record. Examples include the pension-income-tested schemes in Finland and Sweden.

164. In earnings-related schemes, there is a great tension in the goal of protecting people with contribution gaps and the insurance aspects of the scheme. This is particularly obvious in the ‘notional accounts’ systems in Italy and Sweden, whose main objective is to enhance the ‘actuarial fairness’ of the pension scheme. However, if benefits are related more closely to contributions then the scope for protecting people with low lifetime levels of contributions is curtailed.⁴⁵ Italy relies on its social assistance system to protect low-income workers, although periods of sickness, maternity, military service and unemployment are credited. Sweden allows for ‘imaginary’ contributions for periods spent out of the labour force for periods with caring responsibilities (and unemployment, sickness, education *etc.*).

165. The United Kingdom follows a similar approach in its public, earnings-related scheme (Serps). Under home-responsibilities protection, periods spent out of work caring for children under 16⁴⁶ or for elderly relatives are credited. So people can earn a full entitlement to both the basic pension and Serps with just 20 years of actual contributions. Although the United Kingdom’s basic scheme is in theory contributory, the scale of the credits for periods not working makes it closer to the universal, residency-tested scheme of, for example, Canada.

166. Japan allows people to accrue the basic pension at one third of the normal rate during specifically exempt periods. Germany allows for so-called credited periods (‘Anrechnungszeiten’) to cover particular episodes of sickness, rehabilitation, unemployment, further education, *etc.* Since 1992, both parents have been able to claim credits for the first three years after the birth of a child should they so choose.

167. Some earnings-related schemes offer some protection to people with broken work histories with a progressive formula. This does not involve a credit for periods spent out of the labour force, rather by paying a proportionally higher pension to lower earners it protects, for example, women who work part time for a number of years. German workers earning under half the average can have their pensionable pay increased and the United States pays a much higher replacement rate on earnings up to 37% of average. Canada and the United States exclude some of the lowest earning years from the lifetime average — 15% of the total number of years and five years respectively — which has a similar effect. Canada also excludes periods of low earnings for people raising a child under seven from the calculation of average earnings.

168. The remaining earnings-related schemes, however, have no specific provisions for contribution gaps. These are Finland⁴⁷, Italy (mentioned above) and Japan, plus occupational schemes in the Netherlands and Sweden.

Quantitative modelling of the effect of these provisions on pension benefits is highly sensitive to the precise assumptions about earnings histories, career paths *etc.* In particular, the effect interacts strongly with the general pattern of pension provision with earnings. For example, the United Kingdom has probably the most comprehensive system of credits for periods out of the labour force of the nine countries studied. Since its system provides relatively low levels of benefits overall, however, the actual benefit level may not be much higher than a country with narrower protection for contribution gaps.

45 See Disney (1999*a,b*) for an extensive discussion of the tension between redistribution and actuarial fairness.

46 Or under 18 and still in full-time education.

47 Although is an absence from work (*e.g.* for maternity leave) lasts less than one year than the worker will be covered.

5.3 *Self-employed*

169. The self-employed make up a significant and often growing minority of the workforce in many of the countries surveyed. Table 14 summarises the treatment of the self-employed in the nine countries' pension systems.

170. All the countries require the self-employed to participate in at least some mandatory pension programmes. However, in countries with a two-tier pension system, it is common for the self-employed to be covered by only the basic tier. Examples include Canada, Japan, the Netherlands and the United Kingdom. Finland, however, operates a separate mandatory occupational scheme for the self-employed that delivers the same benefits as the schemes for employees.

Table 14. **Pension systems and the self-employed**

<i>Country</i>	<i>Coverage of self-employed</i>
Canada	Basic scheme only Not in earnings-related schemes (CPP/QPP)
Finland	Basic scheme Separate occupational plan (YEL/MYEL)
Germany	State scheme
Italy	State scheme
Japan	Basic scheme only
Netherlands	Basic scheme only
Sweden	Whole mandatory system
United Kingdom	Basic scheme only Not required to have second pensions (Serps, personal or occupational plans)
United States	State scheme

5.4 *Post-retirement indexation of pension benefits*

171. The results so far have presented pension values at retirement, but ignored the issue of the uprating of pension benefits after retirement. Indexation procedures, as this section shows, have an important effect on the lifetime value of pension benefits.

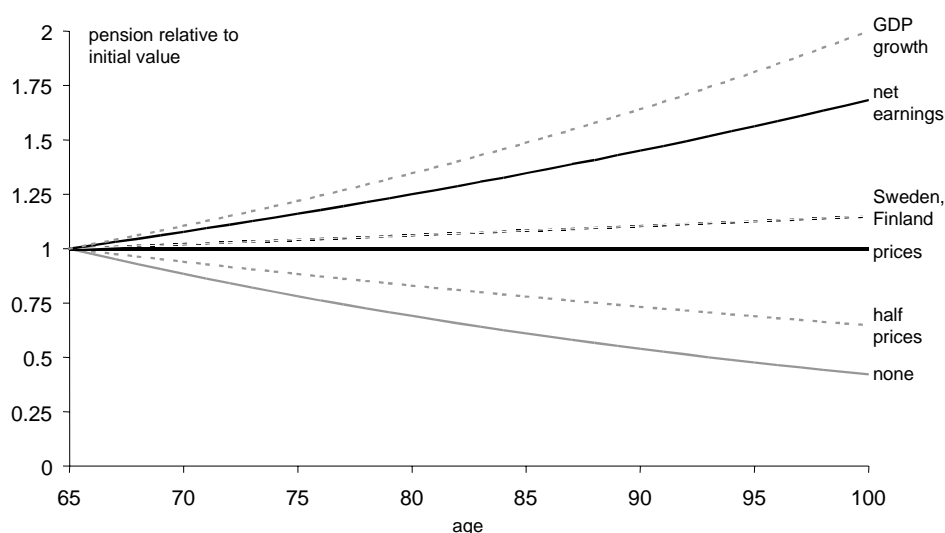
172. Table 15 summarises the post-retirement uprating procedures (based on the country chapters), ranked by the generosity from the least favourable at the top to the most favourable at the bottom. Private pensions in the United States are rarely changed once in payment. Automatic uprating is also rare in Canada, but the average of *ad-hoc* and automatic increases has, in the past, been roughly a rise of half of price inflation. Price uprating is common, particularly in public schemes, but the United Kingdom also requires its private pensions to index benefits (up to a ceiling). Sweden and Finland have complex formulae. Both grant real increases when real earnings are growing, in Sweden if pay growth exceeds a norm and in Finland simply if real wage growth is positive. Germany and the Netherlands index pensions in payment to net pay: the net minimum wage in the latter case and net earnings of pension contributors in the former. Finally, Italy increases pensions in line with a moving average of GDP growth.

173. The difference between these indexation procedures in a single year is small, but over time, the differences compound. Pensions can, of course, be paid for many years or even decades. Figure 10 shows the effect on the pension value over time of different indexation procedures from age 65. The Figure assumes that real earnings and real GDP grow by 2% a year, and that price inflation is 2%. The increase in contribution rates to finance the growing demographic burden on pension systems is assumed to reduce net wage growth below gross wages, to 1½% a year. In Germany, for example, the contribution rate for pensions was projected to increase from 19.3% in 1995, to nearly 30% in 2030.⁴⁸ The Figure is normalised around price indexation, which keeps the real purchasing power of the pension constant.

Table 15. **Post-retirement indexation procedures in different pension systems**

<i>Uprating procedure</i>	<i>Country and scheme</i>
No indexation	United States: occupational schemes
Half prices	Canada: occupational schemes
Prices	Canada: public schemes Finland: basic public pension Japan: public schemes Sweden: means-tested pension United Kingdom: public and occupational schemes United States: public scheme
Gross earnings less 1.6%	Sweden: earnings-related scheme
Gross earnings 20%, prices 80%	Finland: earnings-related scheme
Net minimum wage	Netherlands: basic public pension
Net earnings	Germany: public scheme
GDP growth	Italy: public scheme

Figure 10. **Effect of different post-retirement indexation procedures on pension values in payment**



48 Börsch-Supan (1998). This is equivalent to a 0.3-0.4% difference between net and gross earnings.

174. By age 80, the absence of indexation cuts the real pension value by more than 30%, even at the relatively low level of 2½% inflation. Semi-price indexation, the average in Canadian private pensions, would cut the pension value by 17% over the 15 years from age 65 to 80. The formulae in Sweden and Finland give very similar results under these assumptions. At age 80, the pension is 6% higher in real terms. Net earnings indexation would give a much larger rise — 25% — while full indexation to earnings or GDP growth would increase pensions by 30% over 15 years.

175. Using a mortality table, it is possible to calculate the effect on the lifetime present value of the stream of pension benefits uprated in different ways. The results of this exercise are shown in Table 16. With price indexation, the annuity factor at age 65 is 13.1. This means that a pension benefit of \$1 000 a year would have a present value of \$13 100. The absence of indexation cuts the real present value of a pension stream by 17.7%. Indexation to GDP growth, giving a 2-per-cent-a-year increase, means the pension stream is worth an extra 19.2%.

Table 16. **Net present value of pension under different indexation procedures**

<i>Uprating procedure</i>	<i>Annuity factor</i>	<i>Relative to price indexation</i>
No indexation	10.7	-17.7%
Half prices	11.8	-9.6%
Prices	13.1	0%
Gross earnings less 1.6%	13.5	3.4%
Net minimum wage	13.5	3.5%
Net earnings	14.9	13.9%
GDP growth	15.6	19.2%

6. Conclusion

176. This paper has calculated prospective pension entitlements for illustrative workers in nine countries retirement-income systems. It has looked at both public and private schemes and at the effect of the direct tax system (personal income tax and social security contributions). The main focus has been on the treatment of workers at different income levels, but it has also looked briefly at different family types and workers with different career patterns. Ongoing work, involving the author and the OECD Secretariat, is extending the analysis to look at the position of people retiring at ages other than the standard pensionable age.

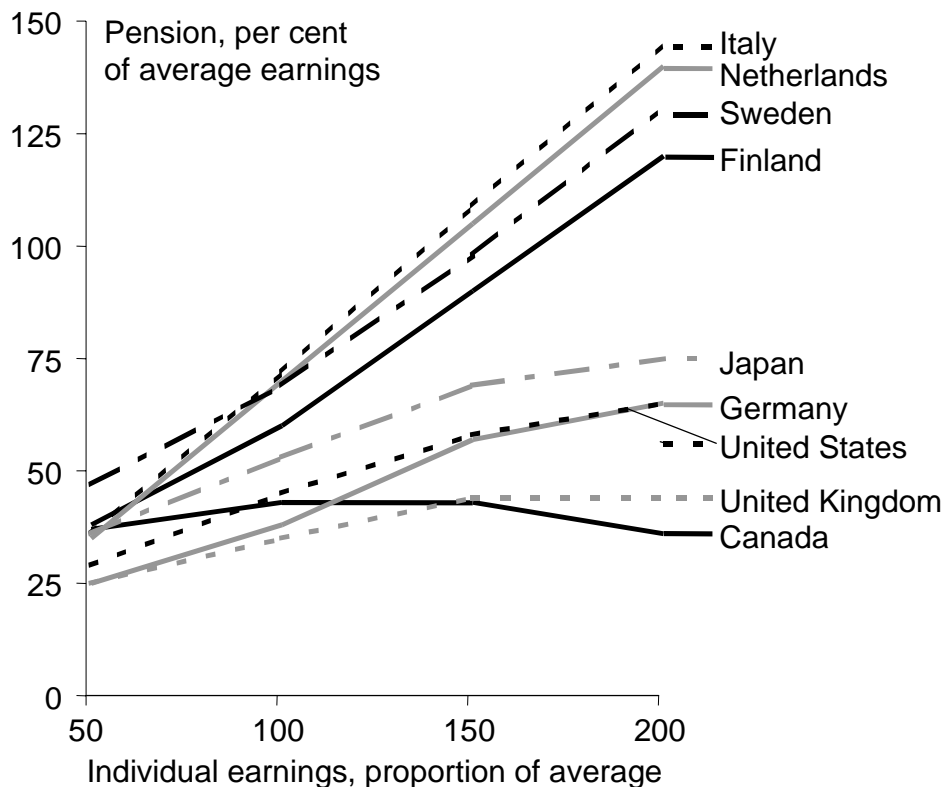
177. The most striking finding is the pattern of statutory pension values for people with different earnings levels. This result is summarised in Figure 11. The chart looks at full-career workers earning various proportions of the economy-wide average: half, average, one-and-a-half times and twice average pay. The vertical axis shows the corresponding individual pension value as a proportion of economy-wide average earnings. In Italy, the public pension scheme has a high ceiling. It is designed to achieve a great degree of earnings replacement, even for high-income workers. A similar effect is achieved by the statutory occupational pension system in Finland and the quasi-mandatory occupational schemes in the Netherlands and Sweden. The Dutch and Finnish systems have no ceiling to benefits; in Sweden, the ceiling is very high.

178. At the other end of the spectrum, the philosophy of the Canadian and British systems is very different. These systems are more redistributive. They ensure that all pensioners achieve a basic standard of living rather than aiming to give everyone a certain level of earnings replacement. This has led to

development of extensive voluntary private coverage, particularly among higher-income workers. Both countries have mandatory earnings-related public schemes, but these have low ceilings and relatively low accrual rates.

179. Three countries — Germany, Japan and the United States — are intermediate cases. The German and American public pension schemes have a redistributive formula and ceilings to pension benefits below the four countries at the top of the chart. Japan's scheme is a two-tier one with a major role for the basic pension and a relatively low accrual rate in the earnings-related scheme.

Figure 11. Pension values as a proportion of economy-wide earnings for workers earning between one half and twice average



180. It is interesting to contrast these results with other analyses carried out as part of the OECD's retirement-income reviews. The analysis of income-distribution data found that the nine countries achieve very similar outcomes in terms of the incomes of older people relative to people of working age. In countries that do not provide comprehensive earnings replacement for higher-income workers, such people make voluntary provision, either through occupational or personal pensions or other forms of saving. This substitution of different forms of retirement-income provision is, of course, widely recognised in the pension literature.⁴⁹

181. The second key finding of this paper is the impact of the direct-tax system on the living standards of the elderly. This is both because of the general progressivity of the income tax and because pensioners often receive favourable treatment under the income tax and social security contribution regime. Net replacement rates — pensions after tax as a proportion of net earnings — are typically 10-15 percentage points higher than gross. The tax advantage makes up almost a third of the net replacement rate for

49 See, for example, Börsch-Supan (1998) and Disney, Mira d'Ercole and Scherer (1998).

someone earning the economy-wide average. It is therefore important that policy-makers do not consider the structure of pension benefits in isolation from the direct-tax position of older people.⁵⁰

182. It is difficult to compare countries' pension systems by looking at their parameters alone. This paper has shown that the pattern of statutory pension entitlements varies enormously between the nine countries.

50 See Keenay and Whitehouse (2001 and forthcoming) for a more detailed analysis of the tax position of older people.

ANNEX 1. COMPARISON OF RESULTS WITH PREVIOUS STUDIES

183. This Annex compares the results presented here with two previous studies to assess the robustness of the findings.

A.1 Johnson (1998)

184. Johnson's study is based on contributions from national experts in ten OECD countries. This annex compares the results from this report with Johnson's results for the six countries where the two analyses overlap.⁵¹

185. Table A.1 compares the results for public pension benefits at three different proportions of economy-wide average earnings: one half, average, and twice average. Table A.2 gives a similar comparison as an individual replacement rate. The results of the two reports are broadly in line. Since Johnson's data for the Netherlands relate to the public scheme only, the quasi-mandatory occupational schemes have been removed from the current results for comparison.

Table A. 1. Total public pension benefits as a percentage of economy-wide average earnings at different proportions of average earnings: comparison of two studies

	<i>Johnson (1998)</i>			<i>Current report</i>		
	<i>0.5</i>	<i>1</i>	<i>2</i>	<i>0.5</i>	<i>1</i>	<i>2</i>
Canada	35	37	37	37	43	36
Germany	24	45	80	25	38	65
Japan	36	49	72	36	53	75
Netherlands	32	32	32	35	35	35
United Kingdom	19	26	39	25	35	44
United States	23	38	42	29	45	65

Note: figures for the Netherlands are not comparable with previous results in this paper because here they exclude occupational schemes

Source: Johnson (1998), Table 1.1

51 Johnson's paper also includes results for Italy, but these do not include the effect of the 1995 'Dini' reform and so are not comparable.

Table A. 2. Total public pension benefits as a percentage of individual earnings at different proportions of average earnings: comparison of two studies

	<i>Johnson (1998)</i>			<i>Current report</i>		
	<i>0.5</i>	<i>1</i>	<i>2</i>	<i>0.5</i>	<i>1</i>	<i>2</i>
Canada	59	31	15	74	43	18
Germany	37	45	40	50	38	32
Japan	68	49	36	72	53	38
Netherlands	63	32	16	70	35	18
United Kingdom	63	44	33	51	35	22
United States	47	38	21	57	45	33

Note: figures for the Netherlands are not comparable with previous results in this paper because here they exclude occupational schemes

Source: Johnson (1998), Table 1.1

A.2 Eurostat (1993)

186. There are four countries where the current study and Eurostat's analysis overlap. Again, the results are very similar (Tables A.3 and A.4), despite the fact that Eurostat's analysis is based on decade-old (1989) parameters. The main difference is in Italy, reflecting the effect of the two major reforms since then (the 'Amato' and 'Dini' reforms, named after the prime ministers of the time).

Table A. 3. Total public pension benefits as a percentage of economy-wide average earnings at different proportions of average earnings: comparison of two studies

	<i>Eurostat (1993)</i>			<i>Current report</i>		
	<i>0.67</i>	<i>1</i>	<i>2</i>	<i>0.67</i>	<i>1</i>	<i>2</i>
Germany	36	53	78	25	38	65
Italy	52	78	164	38	58	115
Netherlands	34	33	34	35	35	35
United Kingdom	28	33	46	29	35	44

Table A. 4. Total public pension benefits as a percentage of individual earnings at different proportions of average earnings: comparison of two studies

Table A.4.						
	<i>Eurostat (1993)</i>			<i>Current report</i>		
	<i>0.67</i>	<i>1</i>	<i>2</i>	<i>0.67</i>	<i>1</i>	<i>2</i>
Germany	53	53	39	38	38	32
Italy	78	78	82	58	58	58
Netherlands	50	33	17	52	35	18
United Kingdom	42	33	23	43	35	22

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