

AGEING WORKING PAPERS

Maintaining Prosperity In An Ageing Society: the OECD study on the policy implications of ageing

WORKING PAPER AWP 3.7 (Revised)

RETIREMENT INCOME: LEVEL, RISK, AND SUBSTITUTION AMONG INCOME COMPONENTS

This is one of a series of analytic papers that supported the OECD's ageing study, a "horizontal" project in the sense that it involved a number of OECD directorates. The results of the entire project are summarised in *Maintaining Prosperity in an Ageing Society*, OECD 1998. Chapter V of *Maintaining Prosperity*—on retirement income reforms—drew on this working paper, as well as on the larger work on resources in retirement found in AWP 4.3.

This paper looks at the sources of retirement income and how these might change in the course of population ageing. It stresses four points. First, retirement income exhibits a large degree of heterogeneity. While some households are overannuitized, there are still pockets of poverty in old age. This heterogeneity is likely to increase in the future. Second, there may be substitution among five broad classes of retirement income: social security, occupational pensions, earnings, asset income, and private intergenerational transfers. It is important for social policy to understand the associated crowding out. Third, while substitution towards private income sources may keep the level of total retirement income constant when social security income declines, the riskiness of future retirement income packages is likely to change. Fourth, in spite of its importance for social policy design, there is little systematic evidence on the substitution among, and the riskiness of, alternative retirement income packages. In particular, better longitudinal data is required for fact-based policy design.

The author is Axel Börsch-Supan, University of Mannheim CEPR, NBER and Anette Reil-Held, University of Mannheim. This is a revised version of a paper that was commissioned by the OECD for a joint ILO-OECD workshop on the development and reform of pension schemes, held in Paris, 15 -17 December 1997. For any queries, please contact Isabelle Vallard (OECD) at: tel: (33) 1 45 24 19 61, fax (33) 1 45 24 90 98, e-mail: isabelle.vallard@oecd.org.

**RETIREMENT INCOME:
LEVEL, RISK, AND SUBSTITUTION AMONG INCOME COMPONENTS**

by

Axel Börsch-Supan, University of Mannheim, CEPR, NBER

and

Anette Reil-Held, University of Mannheim

SUMMARY

This paper looks at the sources of retirement income and how these might change in the course of population aging. It stresses four points:

- Retirement income exhibits a large degree of heterogeneity. While some households are overannuitized, there are still pockets of poverty in old age. This heterogeneity is likely to increase in the future.
- There may be substitution among five broad classes of retirement income: social security, occupational pensions, earnings, asset income, and private intergenerational transfers. It is important for social policy to understand the associated crowding out.
- While substitution towards private income sources may keep the level of total retirement income constant when social security income declines, the riskiness of future retirement income packages is likely to change.
- In spite of its importance for social policy design, there is little systematic evidence on the substitution among, and the riskiness of, alternative retirement income packages. In particular, better longitudinal data is required for fact-based policy design.

INTRODUCTION

1. Starting point of the analyses in this paper is the observation that the pay-as-you-go (PAYG) public pension systems in most OECD countries are unlikely to survive in their current generosity through the next decades. Public pensions and *social security*, usually termed the “first pillar” of retirement income, will play a less dominant role than it does now because the demographic changes will force the public pension systems to realign their replacement rates. In principle, societies may choose any compromise between reducing replacement rates or increasing contribution rates. Due to international competition, however, economic forces will not permit tax and contribution increases to accommodate current replacement levels, given the magnitude of the demographic changes to come. Indeed, many countries have already started with the process of reducing future pension claims for the current generation of workers, although some of them rather silently. (Germany, for example, will reduce its pivotal net replacement rate from 72 to 64 percent over the next fifteen years).

2. Some countries have a well established second pillar of *occupational pensions* that are mandatory either by government rules or by collective bargaining agreements (examples are the United Kingdom and the Netherlands). These are either of the defined benefit (DB) or the defined contribution (DC) type. Only the DC type plans are reasonably immune against population aging (although not completely, cf. point 21 below). However, in many countries, e.g., the Netherlands, DB plans prevail which share the demographic instability of the PAYG system.

3. In addition to these first two pillars, i.e. annuitized pension income provided through the state and through the employer, there is a complicated web of further *private sources of retirement income*. First, pensions may be supplemented by part-time earnings and by asset income. This set of resources which is provided by the individual is often referred to as the “third pillar” of retirement income (World Bank, 1994). Second, the extended family provides a safety net in addition to the state and the employer, an often ignored “fourth pillar” of retirement income.

4. It appears that workers are beginning to realize the trend to downsize public pensions. Preliminary evidence from savings by cohort indicates that younger cohorts are reacting by an increase in various forms of voluntary private old-age provision, e.g. investments in pension funds, capital forming life insurance contracts, etc. (Börsch-Supan, 1996). I refer to this trend as the *silent transition to partially funded systems of retirement provision* in Europe, where I use the term “funded” in a broad sense, encompassing all voluntary and mandatory contributions to old-age provision that are invested in capital. Because societies have little long-run experience with these retirement incomes, both the dangers of overannuitization on the one hand, and of underprovision on the other hand are present. In addition, this trend is likely to increase income inequality among the retired.

5. Increased private savings are not the only possible response to changes in the public provision of retirement income. It is also likely that the volume of *private intergenerational transfers* will change. I use the term “private intergenerational transfers” to include bequests and private transfers *inter vivos* both of money and in-kind (e.g., time and care). *Inter vivos* transfers can go from parents to children or vice versa. In history, *inter vivos* transfers from children to parents have constituted an important fourth pillar of retirement income. There is evidence that this direction has reversed (Stone et al., 1997). These private intergenerational transfers from parents to children coexist with the huge compulsory intergenerational transfers through the tax and transfer system in the opposite direction.

6. Understanding the *substitution effects within this quadrangle* – social security; occupational pensions; individual earnings and asset income; and private intergenerational transfers – is crucial for understanding the effects of pension policy, in particular the effects of changing the replacement rates of old-age social security, both on the microeconomic and the macroeconomic level. This understanding is needed to estimate *a)* how wide the margin of policy decision is (e.g., how easily PAYG replacement rates can be reduced); *b)* how large the efficiency gains of more capitalisation are (e.g., how much new savings is induced); and *c)* how much crowding out will happen among the components of retirement income.

7. The analysis of these questions is made considerably harder by the *heterogeneity* of retirement income. Substitution may be quite different for distinct household types and income categories. While some households may already be overannuitized, such that further saving incentives will only result in crowding out other saving, other households may add genuinely new private savings in response to a reduction of social security replacement rate. Yet other households, in particular those with very low incomes, may be left without the possibility of accumulating substantive savings at all, resulting in inadequate resources in retirement.

8. The paper is structured around three broad sets of questions. The first set encompasses questions about the *level* of retirement income and its *heterogeneity* within the elderly population. Where are pockets of poverty? When become households overannuitized? The second set of questions concerns the *riskiness* of alternative retirement income packages. Risks include capital market risks, political risks, demographic risks, family risks, and longevity risks. The third and most complicated theme is *substitution* among the components of retirement income: social security, occupational pensions, earnings and asset income, and private intergenerational transfers.

WHAT DO WE KNOW ABOUT THE LEVEL AND THE COMPOSITION OF RETIREMENT INCOME?

9. Virtually all OECD countries have a *“retirement income package”* consisting of public retirement income plus income from other sources. Replacement rates of the public pension system are therefore misleading indicators of the economic status of the elderly. A first step in order to measure all resources available for consumption is to look at total disposable income of those elderly who just retired, and to compare it to the income of workers just before retirement. This is still not the full picture because in-kind transfers, e.g., housing and help in case of illness, may be an important element of available resources in particular for the poorer elderly. In addition, nominal household income levels have to be adjusted for differential purchasing power and differential household size.

10. Table 1 displays „comprehensive replacement rates,“ measured as the average disposable income of those elderly who just retired divided by the average disposable income of workers just before retirement. The figures are based on the OECD Family Resources Data Base. We distinguish between singles and married couples both pre and post retirement.

===INSERT TABLE 1: RATIO OF POST-RETIREMENT TO PRE-RETIREMENT DISPOSABLE INCOME===

Several patterns are fairly common in the eight countries represented in the data. The replacement ratio, undifferentiated across income quintiles, is around 75 percent in all countries except for the United Kingdom and the United States where it is lower. This uniform pattern across countries in particular for married couples is in stark contrast to the different replacement ratios of public pensions. Differentiating across income quintiles is not a

straightforward exercise because retirement may imply a change in the relative income position. Thus, the data depicted in table 1 is only an approximation; precise measures are obtainable only with panel data. With this qualification in mind, table 1 shows that the pre/post-retirement income ratios display astoundingly little variation across income quintiles. Only the lowest income quintile exhibits income ratios which are significantly in excess of the respective average income ratios. Among singles, retirement income in the lowest quintile is higher than pre-retirement income in France, United Kingdom, and the United States. At least on average, these data do not reveal an income problem among elderly. The differences in the redistributive character across the nine countries are stark.

11. There is wide variation in the importance of *public pensions* across countries, in particular as it concerns different positions in the income distribution. This is displayed in Table 2. In this table, mandatory occupational pensions based on a pay-as-you-go system are included in the public system (e.g., in France).

===INSERT TABLE 2: SHARE OF PUBLIC PENSION IN RETIREMENT INCOME===

The relative importance of public pensions is highest in France, Germany, and Sweden, where public pensions cover about 70 percent or more of disposable income (singles and married couples together). The United Kingdom is on the other extreme. Part of this international difference is due to the statutory differences among the average replacement rates of public pensions. While the French and German “retirement insurance“ systems, on one extreme, were explicitly designed in the early seventies to provide *all* retirement income, the United Kingdom public pension system did not have this aspiration. In addition, the redistributive goals are rather different across countries. To take again France and Germany on the one side, and the United Kingdom on the other side as examples, the British system provides little more than a flat basic pension once a worker has opted out of SERPS while French and German public pensions are (almost) strictly earnings related. These differences are well-known and have been documented extensively (see the latest comparison in Gruber and Wise, 1998).

12. There is some evidence that certain OECD countries provide a level of public pension income that exceeds consumption needs. Preliminary evidence from Germany shows that for many elderly actual consumption is substantially lower than the annuity income from public pensions (Table 3).

===INSERT TABLE 3: ANNUITY INCOME AND CONSUMPTION, GERMANY===

Of all elderly aged 66 and more, more than 16 percent have an annuity income that exceeds consumption by 50 percent; among the elderly aged 75 and more, this percentage rises to almost 25 percent. At least part of this may be due to overindexation. In Germany, retirement income is still double indexed by inflation and productivity. This observation correlates with saving rates that do not become negative in old age with the exception of the United States (Figure 1).

===INSERT FIGURE 1: SAVING RATES IN OLD AGE, MAJOR OECD COUNTRIES===

These findings suggest that these savings are “involuntary“ in the sense that the elderly could not consume their annuity income e.g. for health reasons (Börsch-Supan and Stahl, 1991). These involuntary savings then appear to create large accidental bequests. In this sense, one is led to the judgment that some OECD countries have *overly generous pension systems*, notably France, Germany, and Italy. Note that at the same time, these countries have a more

than twofold higher share of pension expenditures in GDP, compared to the United Kingdom and the United States (International Monetary Fund, 1996, p.6).

13. Nevertheless, there is considerable *heterogeneity* within each country. In this sense, aggregate expenditure data can be very misleading as they only loosely correlate with poverty rates among the elderly (Table 4).

===INSERT TABLE 4: AGGREGATE PUBLIC PENSION EXPENDITURES AND ELDERLY POVERTY RATES===

In particular in those countries which have strictly earnings-related pension formulae, public pension income can be very low when the elderly experienced a short and/or interrupted earnings history. A typical case in point is a single mother in Germany who has spent a substantial time raising children and, because of this interruption, did not enjoy the seniority-based increasing earnings schedule. If these elderly women also have little other income, they are dependent on basic welfare programs. Another area in which pockets of poverty may be expected in the future include persons in the United Kingdom who opted out of the state earnings related pension system and did not sufficiently provide for alternative retirement income. We will see below that heterogeneity is likely to increase in the future.

14. The problem of *pockets of poverty* is amplified by the positive correlation among retirement income sources over the life cycle. In most countries, public and occupational pensions are a function of earnings, and so is the ability to save. Furthermore, because most European countries have elements of seniority wages, episodes of work interruption (unemployment, frequent job changes, child raising) decrease average life-time earnings relative to equally productive persons with uninterrupted work histories. In addition, even family-provided income may not offset this life-cycle correlation of income sources because income tends to be correlated within the extended family. The data from the OECD Family Resources Project do not reveal consistent evidence that income heterogeneity among the elderly is larger than among the working population. Both between quintile variation (Table 5a) and within quintile variation (Table 5b, Germany only) exhibit mixed pictures.

===INSERT TABLE 5: VARIATION IN DISPOSABLE INCOME, GERMANY===

However, correct measurement of changes in income heterogeneity across the life cycle requires panel data. Even so, table 5b shows that there is considerable variation in the lowest income quintile, much more than in the other quintiles except for the upper quintile (which is a statistical result because the upper quintile has an open income bracket). Moreover, this large heterogeneity reflects the pre-retirement (and thus, most probably, also life-cycle) income heterogeneity.

15. The huge difference in old-age labor force participation across OECD countries has been documented extensively. The country studies in Gruber and Wise (1998) show convincingly that these differences are very much in line with the incentives created by social security regulations. The share of *earnings* (often part-time) in the retirement income package is therefore to a large extent an implication of public policy. In the United States, for example, labor force participation declines smoothly as people age, and about 20 percent of males aged between 65 and 70 percent are still participating (part- or full-time, Diamond and Gruber, 1997). In Germany, to take another example, labor force participation falls dramatically between ages 60 and 65, and less than 3 percent of males aged between 65 and 70 are working (Börsch-Supan and Schnabel, 1997). This difference correlates with the lack of actuarial fairness in the German retirement system, and the confiscatory tax imposed by the German earnings test. Earnings of those elderly who still work appear to be more unevenly

distributed then total disposable income (OECD Family Resources Data). This may be due to selectivity because only those elderly, who have high earnings, work.

16. While we have reasonable data on public and occupational pensions as well as on earnings, much less is known about the resources that are available through assets and the extended family. Both types of resources are most probably underestimated. Current *asset income* (interest and dividends) are well measured, but less so withdrawals that occur only once or at irregular intervals. Therefore, we do not have an accurate picture of how elderly draw down their assets. Resources derived from real assets, in particular the consumption value of housing, have to be imputed and are usually not included in surveys on the elderly's economic status. The share of asset income varies substantially across countries. In most countries included in Table 6, it is around 20 to 25 percent. It is slightly higher in Italy but substantially lower in Germany and Sweden (6 to 12 percent). The data for the Netherlands and the United Kingdom, which also exhibit a relatively low share of asset income, do not include mandatory funded pensions as asset income. Traditionally, the asset distribution has been much wider than the income distribution. This is visible in the much higher share of asset income among the richer households in all countries except Italy.

===INSERT TABLE 6: SHARE OF ASSET INCOME BY INCOME QUINTILE===

Thus, a higher share of asset income in total retirement income is likely to increase the heterogeneity of retirement income in the future. The positive correlation between housing wealth and current income; and between housing and financial wealth suggests that liquidity problems are not a particularly burning policy problem (see point 28 below).

17. The least systematic information is available on *private transfer income*. The only recent international comparative data set is a survey for the Commonwealth Fund in 1991, evaluated by Künemund and Rein (1997). Transfers in-kind are particularly hard to measure but might be important. This is indicated in several studies (Canada: Stone et al., 1997; Germany: Berliner Altersstudie, 1992; United States: Kotlikoff and Morris, 1990, and the evaluations of the "Asset and Health Dynamics Among the Oldest Old, AHEAD" data) although systematic evaluations are yet missing. Of particular importance is coresidence of elderly with their adult children. The evidence points to a decline in coresidence rates (see point 24 below). The corresponding loss in resources (including the monetary equivalent of care) is potentially rather large. On average, however, net in-kind transfers appear to flow from parents to children, not the other way around. Canadian data shows that even when parents are aged between 65 and 74, there is more giving than receiving, and only for those elderly that are 75 and older is the direction of net transfers reversed (Stone et al., 1997).

18. It is not impossible to *collect better data* on the resources elderly households have at their disposal. The experiences with the first two waves of the AHEAD and the "Health and Retirement Survey, HRS" panels in the United States are very positive and have produced a wealth of new results.

WHAT DO WE KNOW ABOUT THE RISKINESS OF ALTERNATIVE RETIREMENT INCOME PACKAGES?

19. The various retirement income packages are characterized not only by their level of total retirement income which they are expected to provide but also by the *risk* that they carry. These risks include demographic risks, political risks, capital market risks, and family risks.

20. Risk is to be distinguished from *vulnerability*. While risk (ex ante) is measured typically as the expected variance of the retirement income package, vulnerability can be expressed as the probability that the retirement income package will provide an income that will be at or below the subsistence level. Economists tend to be reluctant to make value judgments about income inequality; vulnerability, however, is almost unequivocally agreed upon as to be avoided. If the heterogeneity of retirement income increases, it is the danger of increased vulnerability that deserves most policy attention.

21. *Demographic risks* are associated with both PAYG and funded systems. The demographic risk of a PAYG system has been documented extensively (OECD, 1988). Note that most demographic trends can roughly be foreseen. There are still two reasons why the demographic changes carry risks. First, residual uncertainty remains, in particular due to migration. Second, it is still far from clear how pension policy will respond to the demographic changes. Thus, from an individual point of view, the consequences of demographic changes to her/his pension are uncertain. As the dependency ratios in most OECD countries will increase, the net present value of participation in the PAYG systems will decrease. This decrease may come through increases in the tax and contribution rates, through reductions in the replacement rates, through a shift in retirement age (which lengthens the time in which taxes are paid and shortens the time in which benefits are received), or a combination of the three. In Germany and the United Kingdom, calculations show that the corresponding internal rates of return of the PAYG system will be negative for cohorts born after 1960 (Germany: Schnabel, 1997; United Kingdom: Disney, 1996, p.77). France and Italy will have similarly low internal rates of return. For the younger cohorts (born after 1970), the internal return of the PAYG system is mainly dependent on demographics; for older cohorts (born between 1950 and 1970), it is dependent on the specific policy mix that will be applied to the PAYG systems in order to adapt them to the demographic changes (Figure 2).

===INSERT FIGURE 2: INTERNAL RATE OF RETURN, GERMAN PAYG SYSTEM===

Funded pension systems also carry a demographic risk because capital will be abundant relative to labor when the ratio of workers in the total population declines. The corresponding decrease in the rate of return of capital, however, is much lower than in the PAYG case. Estimates for Germany indicate a decline from some 5.5 currently to 4.5 percent around 2030 (Börsch-Supan, 1995).

22. *Political risks* refer to the risk that claims on retirement income are altered by political action. From an individual point of view, political risks are a “risk“ because when workers have to make a decision now (e.g. how much to save in order to ascertain a certain level of retirement income) they face uncertainty about future pension income due to uncertain policy actions. In the case of funded pensions, funds may be used for purposes other than those originally designated, or, in the worst case, simply be appropriated. For example, funds under government control may be used for government consumption rather than investment, reducing the rate of return. (Examples with this risk include the Social Security Trust Fund in the United States or the newly introduced trust funds for civil servants in Germany.) PAYG pension systems face the risk of legislative changes. German and Italian workers, for example, experienced a flurry of pension reforms since 1990, and further reforms are expected. While these reforms may address the demographic changes, they are superimposed by short-term considerations. The uncertainty facing individual workers with respect to their future PAYG pension claims has frequently been documented in polls and surveys.

23. *Capital market risks* are intrinsic to funded pension systems. They include variation in the real rate of return, the risk of inflation if future pension claims are expressed in nominal

terms, and the risk of exchange rate fluctuations if claims are denominated in a different currency than consumption. It appears that the risk-return profile of the international capital market has unambiguously shifted: while the real rate of return of the three major OECD business sectors has changed from below 3 percent p.a. in the 1970s to well above 7 percent p.a. (McKinsey Global Institute, 1996), also risk, measured as coefficient of variation, has decreased. This may be due to more experience with the “management“ of capital markets and is reflected in the relative ease with which major crises such as the United States stock market crash in October 1987, the bubble burst in Japan 1990, and, more recently, the crisis in Mexico have been absorbed in comparison to the far reaching consequences of the crises that occurred between World Wars I and II. Inflation risk will depend on future monetary policy, in Europe dominated by the developments within the European Monetary Union and the introduction of the Euro. Instruments such as inflation-indexed bonds will internalize the inflation risk that pensioners are exposed to within the government and the monetary authorities. While PAYG systems are exposed to demographic risk, they are immune against inflation risks because claims are typically indexed by wages and/or purchasing power.

24. A risk category that is often ignored are *family risks*. Many countries (e.g., Germany and the United States) have spouse supplements or similar mechanisms that link one spouse’s retirement income to that of the other spouse. As divorces have become much more frequent in most OECD countries, the risk of low retirement income has increased, in particular for women with interrupted earnings histories. Individualized pension systems (e.g., Sweden) do not carry this risk. The risk of loosening family ties are obviously relevant for all family resources, including the option value of receiving help from, and coresiding with, own children or other members of the extended family when frail. There is some evidence that the ex ante probability of receiving in-kind help from, or coresidence with, own children declines in Europe and Japan.

25. The popular discussion in many European countries tends to *overemphasize* return risks in capital-market based funded systems, while it at the same time puts *too little emphasis* on the demographic and political risks of the PAYG system. In assessing the relative risks, it is often overlooked that investment risks can be diversified across countries while the risk intrinsic in the PAYG system cannot. It is also frequently overseen that risk has to be judged in connection with return. The German PAYG system, to take up the example of Figure 2, will provide an internal rate of return for a worker born in 1960 of approximately between -0.5 percent to 0.5 percent, depending on the policy mix. In turn, the annual rate of return of corporate investment, based on a five-year moving average, has fluctuated between 4 and 16 percent in real terms between 1980 and 1995. If this pattern prevails, risk measured as variation in the rate of return is higher in the capital market, but the lowest return in the capital market still dominates the highest return of the PAYG system.

26. This popular discussion also underemphasizes the risks intrinsic in *book-reserve based occupational pension funds* specific to some OECD countries (e.g., Austria, Germany). These schemes combine the risk of losing one’s job with the risk of losing one’s pension when the enterprise fails. In addition, book-reserve based pensions have historically not produced corporate governance mechanisms similar to the checks and balances in the capital market. While workers have changed their portfolio composition in American-style individual retirement accounts and thus put pressure on these funds to perform, similar mechanisms have been found much harder to establish in a book-reserve system. Book-reserve based occupational pensions are in this respect similar to government trust funds; they are exposed to analogous risks of low return and appropriation.

27. The *longevity risk* (i.e., the risk of running out of savings before the end of the life) is perfectly covered in PAYG pensions but only partially in funded pensions. The adverse selection and moral hazard problems of annuities in old age are still not fully understood. While there are many studies on adverse selection due to private information about life expectancy, moral hazard is an under-researched area although it appears to explain segments of missing markets (e.g., no fair annuities are available even when they are bought at young age). The prevalence and significance of private information is an important missing empirical piece in explaining the (partial) failure of annuity markets.

28. The risks for funds based on stocks and bonds are reasonably well understood. Less understood are the risks associated with investment in *housing*. The marketable wealth of most households, notably in the middle class, is concentrated in the own family home. While housing wealth may serve as a shield against inflation, it is exposed to its own variant of “capital market risk” (in the sense that its price may fall relative to consumption) and demographic risk. The price risk is mostly associated with changes in tastes, in neighborhood quality, etc. which cannot be diversified away because the portfolio in most cases is just the one own house. The demographic risk has been stressed by Mankiw and Weil (1989) who claim that the declining cohort size will dramatically reduce housing demand and thus housing values. The magnitude of their estimate (47 percent in the United States from now to the peak of population aging), however, is very much under dispute (see the discussion in Hendershott, 1992) because changes in household size and preferences for space may offset most of the demographic effect. In addition, even when housing values would decline, the consumption value of housing for the elderly who stay in their own home remains unaffected; in this sense, the consumption part of owner-occupied housing works like a perfectly indexed annuity. The downside risk will only be realized when the elderly person wants to sell the house, either because of preference (e.g., move in a smaller house or nursing home) or because of liquidity constraints. However, there is little evidence that the elderly are indeed liquidity constrained (“housing rich and income poor”). Rather, housing wealth and retirement income are strongly positively correlated (Feinstein and McFadden, 1988; Venti and Wise, 1990).

29. Even if the level of retirement income would remain the same as it is now (e.g., by perfectly substituting PAYG pensions by asset and family income), the *risk exposure of retirement income* is likely to change anyway because the components of retirement income carry differential risks. Little systematic work has been done to assess the ex-ante risk of alternative retirement income packages. This has contributed to misperceptions such as those mentioned in point 25 above. Because earnings are correlated over the life-cycle with the ability to accumulate assets, and with the resources available in the extended family, the *extent of vulnerability* is also likely to increase with the declining share of PAYG pensions. At the same time, heterogeneity of retirement income is likely to increase because income components with individual risk for each household (e.g., asset income) will have a larger weight, while income components with common risk for all elderly (e.g., PAYG pensions) will have a smaller weight in the retirement income package.

30. Managing the return risk of funded pensions on an individual level requires in most OECD countries more experience; exceptions are the Anglo-Saxon countries. Households have to “experience” the force of compound interest to learn that starting too late with saving is very expensive and increases risk exposure. Techniques like shifting portfolios from risky to conservative during working life are not well-known, instruments with a dynamic portfolio cannot be bought easily.

31. This leads to the observation that even in modern capital markets there are still many underdeveloped or *missing institutions and instruments*. Some capital market instruments, such as instruments with dynamic portfolios or a guaranteed minimum return, are in the process of being created by the market as funded retirement income provision becomes more widespread. Some institutions may be missing because of market failures; and must therefore be created by the state, such as fair annuities (see point 27 above), an equivalent to deposit insurance for pension funds, or inflation indexed bonds.

WHAT DO WE KNOW ABOUT SUBSTITUTION AMONG COMPONENTS OF RETIREMENT INCOME?

32. If the level of one component of retirement income is changing, say PAYG-financed public pensions, the levels of the other income components are likely to respond. This *substitution* can take many forms. Public income may *crowd out* private income; and vice versa, households will tap into private income sources when public income declines. Public pensions may be substituted for by occupational pensions, when workers are able to leverage their position in a collective bargaining agreement (as German workers did in sick pay); and they may be substituted for by individual saving, postponement of retirement or part-time earnings. The extended family plays a complicated role in this substitution process. Again, family support may be crowded out by state provision of retirement income, although some researchers claim the opposite (“*crowding in*“, see below). Public intergenerational transfers (such as PAYG pensions) may be offset by private intergenerational transfers (such as *inter vivos* or bequests). This section discusses the various mechanisms of substitution among retirement income components.

33. There is very little *evidence* available on magnitudes and even directions of these substitution effects, and what is available tends to be highly debated. One reason we know so little is a lack of policy variation within countries, and the need for long time series because adjustments may take as long as one generation to materialize. One alternative is to exploit international variation (e.g., Rein and Kühnemund, 1997). This is not without its own problems because data sources are often incompatible and because other country-specific factors may confound the inference. Ideally, a data set should exploit international and intertemporal variation by combining several cross sections at various points in time. In this way, country-specific factors that are reasonably constant over time can be filtered out. A second reason for the scarcity of evidence on substitution among retirement income sources is that one needs data on all retirement income sources simultaneously. The OECD Family Resources Data is a first step in this direction although it is only a snapshot in time that does not permit an evaluation of reactions to policy changes in any single country.

Table 7, again based on the OECD Family Resources Data Base, shows the result of two kinds of substitution processes: between transfers and self-provided income, and between public and other transfers.

===INSERT TABLE 7: COMPOSITION OF RETIREMENT INCOME===

Japan and Italy stand out with a particularly high share of self-provided retirement income, while the share of transfer income is especially high in Germany, Sweden, and the Netherlands, classical examples of „welfare states“. Within transfers, the United Kingdom, the United States, the Netherlands (and, to a lesser degree, Sweden) have more mixed systems between public and private transfers, the latter mainly being defined benefit plans provided by the employer. In these cases, occupational pensions have filled in for state provided pensions. Some of these occupational pensions are mandatory, but in many cases (e.g., in the United States) they are voluntary fringe benefits by the employers. Table 7 should be interpreted rather carefully because the different compositions of retirement income packages that are visible in this table are outcomes of substitution processes that were partially driven by historical differences of pension systems but also by other differences across countries.

34. A few „*natural experiments*“ have shown that substitution can occur very quickly. In Germany, for example, unions have successfully used collective bargaining agreements to compensate for a reduction in state-provided transfer income. When the state guaranteed sick

pay was reduced in the beginning of 1997 by 20 percent, employers were forced by strike to compensate for this transfer loss.

35. *Substitution between earnings and public pensions* appears to be largely governed by the institutional constraints imposed by the pension systems, most notably earnings tests and the actuarial adjustment of pensions to retirement age. This has been discussed in point 15 above.

36. Economic theory (Homburg, 1988) and empirical evidence from time-series (Feldstein, 1974, for the United States; Kim, 1992, for Germany) show that *substitution between private savings and publicly provided pensions* is very large. The Kim and Feldstein studies exploit the time-series variation in the replacement rates of the United States and the German PAYG pension system. They show that the historical increase of the imputed pension wealth has decreased the household saving rate. It is remarkable that this could be found also for Germany with its relatively high saving rate. It is important to view substitution between pension income and saving in a life-cycle context. While the Kim and Feldstein studies refer to substitution between saving of *workers* and their expected PAYG pension income, the case of Germany also shows a positive correlation: high pension income may actually create high saving *in old age* (see point 12 above). Because future PAYG pension income cannot be borrowed against, the observed accumulation of savings among some elderly Germans represent a liquidity effect created by overannuitization. In an almost tautological sense, substitution then occurs through higher bequests, see point 39 below.

37. However, it is not yet clear to which extent and speed substitution would work the other way around. There are indications that cohort-specific saving rates have increased again after a historical low for the cohorts born around 1940-50 in both Germany and the United States (Börsch-Supan, 1996, Figure 2). Nevertheless, we have too little empirical information to know whether this additional *voluntary* saving is sufficient to offset the expected decline in PAYG pension income, and how much of retirement savings has to be made *compulsory* if individual saving accounts are to replace a major portion of PAYG pensions as is proposed, for example, in the United States.

38. The decline in expected PAYG pension income (i.e. the expected decline in the implicit rate of return of the PAYG system) has precipitated *substitution towards retirement income sources that provide higher rates of return*. This is evident among those workers who actually have a choice between a PAYG-based and a funded pension (which, in most OECD countries, most workers do not have). In Germany, only the self-employed have a choice between participation in the general PAYG system and voluntary saving. Figure 3 depicts the dramatic decline of their participation in the PAYG system during the recent years.

===INSERT FIGURE 3: DECLINE OF VOLUNTARY CONTRIBUTIONS TO GERMAN PAYG SYSTEM==

In the United Kingdom, the option to leave the state earnings-related pension system (with an expected negative rate of return, see point 21) was chosen by the majority of workers (Disney, 1996, p.84). Thus, there is clear evidence that differences in the expected rates of return result in substitution among retirement income sources.

39. Whether there is *substitution between public pensions and intergenerational transfers inter vivos* (money and in-kind) is subject to dispute. Künemund and Rein (1997) point out that the generosity of public pensions and the extent of intergenerational help are positively correlated in a sample of five countries. In this sample, Germany is the country where elderly receive most help from children living outside the elderly's home, while in the United States,

they receive the least. At the same time, Germany has the most generous public pensions, while the United States have the least. This would correspond to crowding in rather than crowding out of family help by the state. On the other hand, Germany has much lower coresidence rates than the United States, reversing the correlation (Börsch-Supan, 1994). In addition, in-kind help appears to be asymmetric, as the net flow is from the parents to children and not vice versa (Stone et al., 1997). There is no systematic time-series data on receiving help. However, coresidence rates have declined in the United States (Börsch-Supan, 1990), Germany (Börsch-Supan, 1992), and Japan (Takayama, 1992, p.47) over the last decades. Whether this is indeed attributable to the increasing generosity of public pensions can, of course, not be inferred from aggregate data.

40. Similarly, *substitution between public pensions and bequests* has yet escaped econometric measurement. However, the combination of generous public pensions and a high bequest volume in France and Germany (Reil-Held, 1997) may point in this direction: high public pensions create high involuntary saving rates in old age (see points 12 and 38) which in turn lead to high “accidental” bequests. If this line of causality would indeed hold, two lessons would follow. First, any analysis of substitution must include private intergenerational transfers in addition to mandatory pensions and private saving. Second, PAYG dominated countries first transfer income from the young to the old (by mandatory PAYG with generous replacement levels, financed by distorting taxes and social security contributions) only to experience large - at least partially - offsetting private intergenerational transfers in the opposite direction (by voluntary *inter vivos* transfers and bequests). This is quite an inefficient way of generating a net transfer among generations: the share of dead weight loss in the resulting net transfer is rather large.

41. The observation that intergenerational transfer volumes are large, and that parents appear to give more to their children than they receive, puts doubt on the validity of conventional welfare exercises that value economic outcomes on a purely individualistic base. We still lack evidence on the mechanisms that generate these transfers. However, whether they are altruistic or strategic, or guided by the necessity to overcome moral hazard, the very fact that they exist *invalidates welfare analyses* that are based on overlapping generations which are only linked through the market, and makes concepts such as intergenerational equity questionable. This also holds for welfare analyses that either show or reject welfare improving transitions of PAYG to funded pension schemes.

CONCLUSIONS FOR THE SOCIAL POLICY AGENDA

42. Due to the demographic changes, the retirement income package will invariably change in the future. This may or may not change the level of retirement income (relative to average income) but even if it keeps relative retirement income constant, it is likely to increase the risk compared with today’s retirement income, and it is likely to expose more people to economic vulnerability. Realizing increased heterogeneity is important for pension reform. It implies that a reform must protect the vulnerable (with few years of contributions due to short and intermittent work careers) while reducing benefits for those with average and higher incomes. Such a system will invariably be more redistributive. Thus, retirement income for workers with average and higher incomes will have an even larger weight of personal income. This can be asset income but also (part-time) labor income, calling for more flexibility to permit the combination of (part-time) work while receiving a full actuarially adjusted pension.

43. Evidence on the substitution among different components of retirement income provision is sadly scarce. This is mainly due to the lack of longitudinal data. Thus, it is hard to predict individual responses (e.g. in terms of private saving or old-age labor supply) and to assess where public policy needs to watch out. In particular, crowding out or crowding in of public policy needs to be better understood. This is where data collection efforts should be concentrated.

44. There are three particular reasons why data collection in this area is important:

- First, it permits an estimate of how wide the *margin of policy decisions* is, i.e., how “easily“ the replacement rate of public pensions can be reduced. It appears that this margin is wider than currently suspected, although one has to be careful in the design to avoid creating pockets of poverty.
- Second, the elasticity of private savings with respect to changes in public social security provision is a crucial ingredient of the *efficiency of funded pension systems*. Only if new savings are created is a transition to funded systems efficient. There appears to be still too little evidence on this point to muster broad agreement for the superiority of more funding.
- Third, intergenerational transfers may have been *crowded out* by the current generous public pensions. If so, a partial transition to funded pensions may decrease bequests and thus undo at least partially the huge volume of transfers from the old to the young generation. In this case, a transition to fully funding is pareto efficient without expensive compensation schemes à la Feldstein and Samwick (1996) and Kotlikoff (1996), because intergenerational compensation happens through an “automatic“ adjustment of intergenerational transfers. The so-called transition burden becomes much smaller.

45. Another reason to better understand substitution effects is to anticipate where missing institutions have to be created. This is particularly important because the exposure to risk is likely to be larger in the future. Missing institutions appear to be the greatest dangers of the current “silent transitions“ to fully funded systems of retirement income provision in most OECD countries. Examples for these missing institutions are fair annuity markets in all countries; the lack of a regulatory framework for pension funds and for individual retirement accounts with a consistent tax treatment e.g. in France and Germany; and the lack of a system of deposit insurances on pension funds, preferably on a supranational scale. On the other hand, institutional constraints on labor force participation (earnings tests and actuarially unfair adjustments of pensions to retirement age) are well understood to limit substitution and to suppress old-age labor supply.

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Table 1: Ratio of Post-Retirement to Pre-Retirement Disposable Income ¹

	Single						Married					
	All	Quintile1	2	3	4	5	All	Quintile1	2	3	4	5
Australia	75.8%	..	101.7%	98.4%	75.2%	64.8%	72.1%	..	89.9%	72.2%	60.2%	64.4%
France	89.7%	104.5%	100.0%	93.0%	84.9%	85.6%	78.9%	91.9%	85.1%	81.8%	80.4%	73.1%
Germany	76.5%	96.8%	86.0%	77.9%	73.9%	69.8%	83.5%	87.1%	84.4%	82.8%	79.8%	84.7%
Italy	61.1%	84.1%	75.4%	72.2%	69.3%	61.0%	79.6%	103.3%	82.3%	79.4%	81.8%	74.8%
Japan	86.3%	97.6%	84.6%	78.5%	71.7%	99.0%	75.4%	75.6%	69.6%	66.0%	69.8%	87.0%
Netherlands	74.7%	92.5%	84.1%	72.0%	68.7%	71.9%	77.3%	83.3%	74.2%	69.3%	71.5%	85.9%
Sweden	81.9%	98.0%	85.5%	79.2%	75.5%	80.5%	77.2%	83.2%	75.8%	75.3%	76.5%	77.0%
United Kingdom	68.4%	114.1%	89.3%	69.4%	64.2%	59.0%	67.9%	95.4%	66.8%	61.6%	61.2%	70.1%
United States	61.5%	126.4%	73.8%	63.2%	55.4%	57.0%	46.1%	56.7%	47.0%	43.6%	43.6%	46.2%

1. Pre-retirement income refers to income of singles or families with a head around 55 years of age; post-retirement income is the income of families or singles with a head around 67.

Source: OECD Family Resources Data

Note: Data on first quintile in Australia is unreliable due to small sample.

Table 2: Share of Public Pensions in Retirement Income ¹

	Single						Married					
	All	Quintile1	2	3	4	5	All	Quintile1	2	3	4	5
Australia	77.2%	..	96.4%	89.6%	82.9%	36.6%	46.5%	80.6%	85.6%	74.8%	57.6%	7.5%
France	68.3%	93.5%	89.4%	84.7%	77.2%	52.2%	67.2%	90.1%	83.0%	77.2%	73.5%	51.3%
Germany	81.9%	92.7%	92.4%	87.1%	83.6%	71.2%	70.5%	90.3%	86.6%	84.6%	78.4%	49.1%
Italy	48.5%	88.8%	75.8%	65.4%	49.8%	28.0%	25.6%	35.2%	49.1%	42.9%	29.3%	13.6%
Japan	52.4%	70.4%	73.6%	65.7%	71.2%	33.6%	48.3%	67.8%	76.0%	66.9%	54.7%	26.8%
Netherlands	63.3%	96.3%	90.7%	84.6%	64.0%	32.8%	51.3%	90.4%	78.8%	64.8%	48.6%	8.2%
Sweden	71.1%	82.3%	83.3%	82.0%	76.6%	56.4%	63.2%	86.1%	79.6%	74.2%	66.1%	41.9%
United Kingdom	60.8%	91.8%	89.3%	83.5%	61.4%	30.8%	44.8%	89.7%	75.9%	61.1%	42.3%	18.8%
United States	45.8%	94.1%	85.3%	65.1%	49.0%	22.5%	39.7%	85.6%	65.0%	55.8%	42.0%	20.4%

1. Share of public pensions and other public transfers in gross income of families with a head around 67 years old.

Source: OECD Family Resources Data

Notes: *Mandatory occupational pensions included in France.*

Table 3: Annuity Income and Consumption, Germany

(Percent of households with ratio of annuity income over consumption in given range)

	Age 66-69	Age 70-74	Age 75-79	Age 80+
0.0-1.0	47.7%	43.1%	38.3%	30.5%
1.0-1.5	41.2%	43.2%	40.4%	40.5%
1.5-2.0	9.3%	10.9%	15.4%	19.4%
2.0+	1.8%	2.9%	5.9%	9.6%

Source: EVS 1983 (German Income and Expenditure Survey)

Notes: Annuity income is public pensions, occupational pensions and asset income

Table 4: Aggregate Public Pension Expenditures and Elderly Poverty Rates

(percentages)

	Pension Expenditures (%GDP)	Elderly Poverty Rate
Canada	6.0%	17%
France	13.3%	
Germany	12.3%	11%
Italy	14.2%	
Japan	5.7%	
Sweden	11.3%	
United Kindom	6.4%	29%
USA	6.9%	24%

Sources: IMF, 1996; Smeeding et al., 1988

Table 5: Heterogeneity in Disposable Income

a. Quintile Ratio Pre and Post Retirement income ¹

	Single		Married	
	Pre	Post	Pre	Post
France	6.7	5.5	5.8	4.6
Germany	4.6	3.3	3.6	3.5
Italy	10.2	7.4	11.2	8.1
Japan	5.7	5.8	3.9	4.4
Netherlands	3.4	2.6	2.8	2.8
Sweden	2.9	2.3	2.9	2.7
United Kingdom	7.1	3.7	5.7	4.2
United States	15.1	6.8	8.0	6.5

b. Coefficient of variation (Germany only)

	Quintile1	2	3	4	5
Pre Retirement					
Singles	0.16	0.09	0.07	0.09	0.35
Married couples	0.18	0.07	0.06	0.09	0.31
Post Retirement					
Singles	0.17	0.06	0.06	0.08	0.29
Married couples	0.15	0.06	0.06	0.08	0.44

1. Pre-retirement refers to income of families with a head around 55; post-retirement refers to income of families with a head around 67.

Source: OECD Family Resources Data

Table 6: Share of Asset Income in Retirement Income ¹

	Single						Married					
	All	Quintile1	2	3	4	5	All	Quintile1	2	3	4	5
Australia	21.4%	..	1.2%	10.2%	13.0%	35.6%	21.6%	15.2%	9.2%	16.9%	18.5%	30.9%
France	24.6%	5.9%	10.3%	11.6%	17.9%	36.6%	23.6%	6.3%	12.6%	12.5%	16.8%	37.2%
Germany	8.8%	2.4%	3.3%	5.5%	7.7%	15.0%	11.8%	5.7%	6.7%	8.2%	9.2%	18.3%
Italy	24.3%	10.8%	23.0%	27.1%	28.0%	24.2%	28.5%	35.3%	41.4%	33.1%	28.5%	24.9%
Japan	17.3%	10.1%	11.4%	15.0%	15.6%	20.9%	16.2%	8.3%	9.3%	12.6%	15.4%	21.4%
Netherlands	4.0%	0.7%	2.5%	2.6%	4.2%	6.2%	5.7%	1.5%	2.3%	4.5%	6.4%	8.2%
Sweden	7.4%	7.6%	4.3%	4.9%	7.0%	10.5%	6.2%	5.5%	5.4%	4.5%	5.8%	7.9%
United Kingdom	14.9%	3.8%	3.1%	4.3%	12.5%	28.4%	14.0%	2.0%	6.1%	8.3%	10.6%	23.4%
United States	20.4%	0.7%	5.0%	10.7%	16.0%	31.7%	21.1%	5.3%	8.0%	10.7%	15.4%	32.4%

1. Share of capital income in gross income of families with a head around 67 years old.

Source: OECD Family Resources Data

Notes: Only private asset income (excludes asset income from funded occupational pension plans)

Table 7: Composition of Retirement Income ¹

	Single						Married					
	Transfers		All	Self-Provided Income			Transfers		All	Self-Provided Income		
	Public	Other		Earnings	Assets	All	Public	Other		Earnings	Assets	All
Australia	77.2%	9.9%	87.1%	-8.5%	21.4%	12.9%	46.5%	10.9%	57.4%	21.0%	21.6%	42.6%
France	68.4%	..	68.4%	7.1%	24.6%	31.6%	67.2%	..	67.2%	9.2%	23.6%	32.8%
Germany	81.9%	4.9%	86.8%	4.5%	8.8%	13.3%	70.5%	5.7%	76.2%	12.1%	11.8%	23.8%
Italy	48.5%	..	48.5%	27.2%	24.3%	51.5%	25.6%	..	25.6%	45.9%	28.5%	74.4%
Japan	52.4%	4.8%	57.2%	25.5%	17.3%	42.8%	48.3%	2.6%	50.9%	32.9%	16.2%	49.1%
Netherlands	63.3%	32.5%	95.8%	0.2%	4.0%	4.2%	51.3%	39.1%	90.5%	3.8%	5.7%	9.5%
Sweden	71.1%	18.9%	90.1%	2.5%	7.4%	9.9%	63.1%	19.2%	82.3%	11.5%	6.2%	17.7%
United Kingdom	60.7%	19.7%	80.4%	4.7%	14.9%	19.6%	44.8%	24.4%	69.2%	16.8%	14.0%	30.8%
United States	45.8%	25.5%	71.3%	8.3%	20.4%	28.7%	39.7%	25.0%	64.7%	14.2%	21.1%	35.3%

1. Income sources as a percentage of gross income of families with a head around 67 years of age.

Source: OECD Family Resources Data

Notes: Mandatory occupational pensions part of public transfers in France; earnings may come from younger spouses.

Figure 1. Saving Rates in old age, major OECD Countries

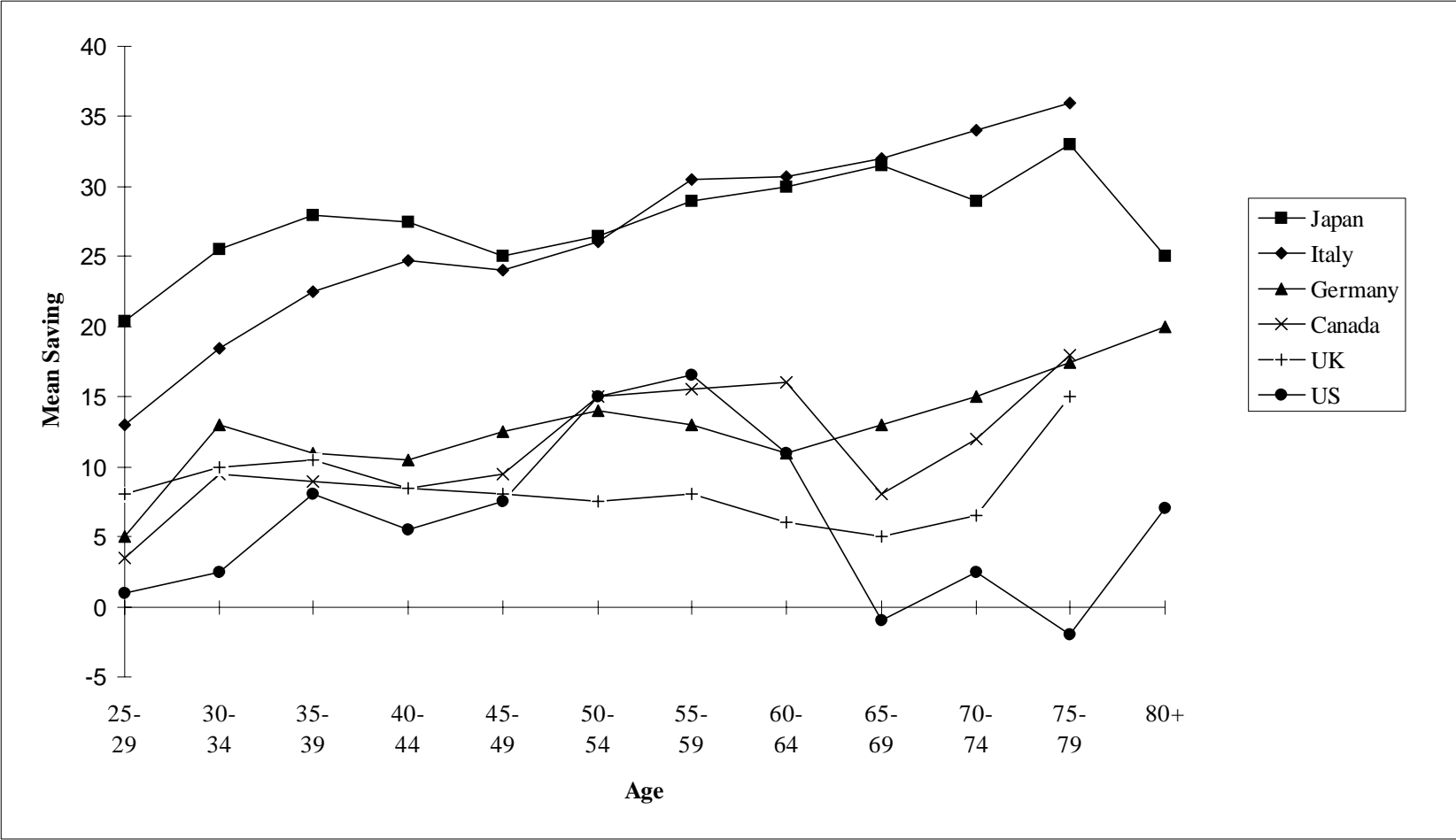


Figure 2. Internal rate of return, German PAYG system

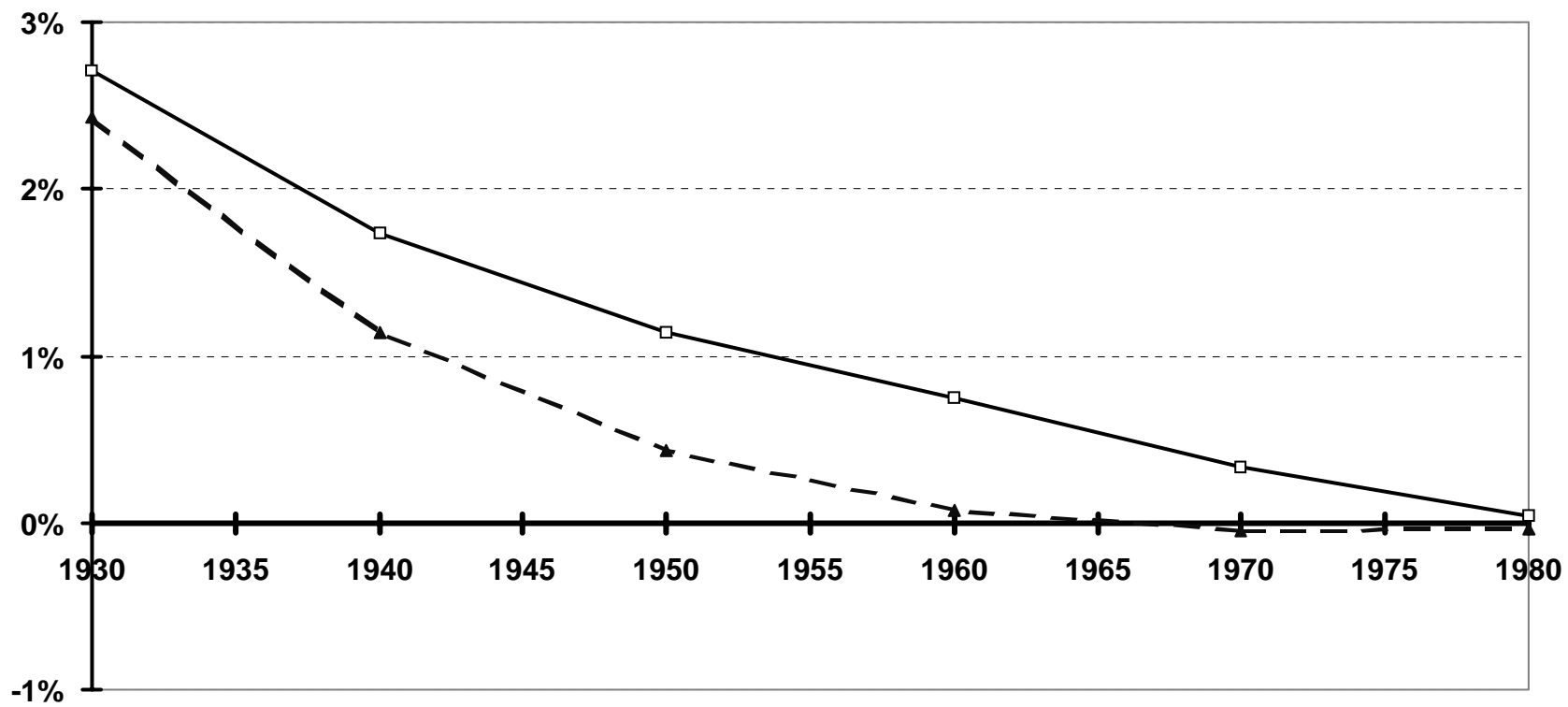


Figure 3. Decline of Voluntary Contributions to German PAYG System

