NBER WORKING PAPER SERIES

SOCIAL SECURITY AND RETIREMENT IN BELGIUM

Pierre Pestieau
Jean-Philippe Stijns

Working Paper 6169
http://www.nber.org/papers/w6169

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1997

This paper is part of the NBER Project on International Social Security Comparisons. We are grateful to Etienne de Callataÿ, Bernard Delhausse, Arnaud Dellis, Sergio Perelman and the members of the NBER project for helpful comments and to the Belgian Science Foundation (SSTC) for financial support. This paper is part of NBER's research programs in Aging and Public Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

Social Security and Retirement in Belgium
Pierre Pestieau and Jean-Philippe Stijns
NBER Working Paper No. 6169
September 1997
Aging and Public Economics

ABSTRACT

Belgium like many other industrialized countries is facing serious problems in financing its social security. Whereas the effects of aging are still to come, Belgium currently experiences one of the lowest attachments to the labor force of older persons. This paper presents the key features of the Belgian social security system and focuses on labor force participation and benefit receipt. Most of the attention is given to the interaction between retirement behavior and the various social security schemes. By measuring the implicit tax/subsidy rate on work after 55 through these schemes, we can so explain the actual pattern of early and normal retirement of Belgian older workers.

Pierre Pestieau
Faculté d'Economie
Université de Liège
Boulevard du Rectorat 7 (B31)
4000 Sart Tilman, Liège 1
BELGIUM

Jean-Philippe Stijns
Faculté d'Economie
Université de Liège
Boulevard du Rectorat 7 (B31)
4000 Sart Tilman, Liège 1
BELGIUM

SOCIAL SECURITY AND RETIREMENT IN BELGIUM

The future of Belgian social security is rather gloomy for a number of reasons pertaining to macroeconomic, demographic and political factors. Unemployment rate is about 10% and should remain at that level for some time. In spite of recurrent programs to correct marked unbalance in public finances, the ratio of debt to GNP is still about 130%. The ratio between over-60-year-olds and the working age is expected to double between now and 2030. Finally, the Belgian political process makes difficult any long run policy reform.

Social security benefit payments in 1990 amounted to 10.60% of GDP; this can be contrasted with 5.75% in 1961 and 6.46% in 1970. In 2048, all other things being equal, the aging of population will push social security expenditure up by 63 per cent. If such an increase were not possible, benefits would have to be cut drastically. It is forecasted that the poverty rate among elderly people could then jump from 4.5% today to 40% by 2040.[1]

Among the reform options contemplated, there is a range of measures aimed at increasing the effective participation rate of people over 50 and eventually raising both the age at which one can draw social security benefits (60) and the mandatory retirement age (65). In that respect, it is crucial to understand the interaction between social security and more generally social insurance on the one hand and the labor force behavior of older Belgians on the other hand. The purpose of this paper is to provide such an understanding.

This paper is divided in three sections. First, we present the relevant evidence on the labor market for older persons in Belgium. Second, we survey the main features of the Belgian social security system: we provide some key figures, summarize the relevant institutional details and put them in line with labor market evidence. In the third section, we present a simulation model aimed at assessing the retirement incentives underlying the Belgian social security system. In the appendices, we provide information on data sources, present a brief cross-country comparison, review previous empirical studies and give an illustration of the fiscal treatment of retirement income.

Before proceeding, two remarks are in order. First, it is important to note that sections 1 and 3 do not rely on the same institutional setting. Section 3 is based on the current social security system after its most

[1] Delhausse *et al.* (1996).

recent reform, such as developed in section 2. The labor market behavior described in section 1 is influenced by institutional features some of which have now disappeared[2].

The other remark concerns the data. There are two types of data depending upon whether they come from surveys or from administrative sources. In the first, the observation unit is the individual or the household. In the second, it is the benefit received: pension, unemployment compensation, disability insurance payment. In this latter case, there is the possibility of double counting as the same individual can draw benefits from two or even three retirement schemes[3]. When we deal with these figures, we have to normalize them.

1. The labor market behavior of older persons in Belgium

1.1 Historical trends

Figures 1 and 2 graph the labor force participation rates of men and women in different age groups since 1947. We focus on four age groups. For men, there is a decline in the labor force participation of all these groups. However, since the early nineties, one observes a slight upturn. The most important drop concerns the age-group 60-64 and to a lower extent 55-59. Note that both for men and women above 60, the participation rate is negligible, at least such as officially recorded. As we show below (Figures 7 and 8), most of the decline in participation rate before 60 is due to mandatory programs of early retirement[4] (*prépension*).

The female labor force experienced a contrasting evolution. Indeed, there are two opposite trends: a structural trend of increasing participation and a downward trend similar to that of men that comes from an explicit policy aimed at forcing elderly workers out of the labor force. For the youngest age-groups between 45 and 54, participation is raising; for the oldest group, participation declines; for the intermediate

[2] See Appendix 1 for further discussion of this.
[3] Most commonly, pension receipts from public and private social security systems. However the various types of social insurance are mutually exclusive in Belgium.
[4] See Section 2.6. for further discussion of mandatory early retirement.

age-group 55-59, one observes a contrasting evolution: a decline up to the mid-eighties and then an increase. The increase in labor force participation of women aged 55-59 is particularly marked since 1992. Indeed, the possibility for women to take early retirement between 55 and 59 was ruled out in 1992. Besides, women were then allowed to postpone retirement to 65 (instead of the previous mandatory age of retirement at 60) in a first attempt to harmonize rules for men and women.

To explain this trend in labor market participation, it is tempting to consider the extent of social security generosity and particularly its evolution over time. Two remarks on this are in order. First, given that in general there is no way to draw social security benefits before the age 60, earlier retirement is financed by unemployment insurance, disability insurance or mandatory sectoral programs of early retirement. Second, such low participation rates can be explained in terms of secular trend as witnessed elsewhere but also as a consequence of an unprecedented high level of unemployment.

In Belgium, since 1956, the entire workforce is covered by the SS system and more generally by the various social insurance schemes. To measure the generosity of social insurance, we can use the increasing percentage of men (Figure 3) and women (Figure 4) drawing benefits from SS, DI and MR (mandatory early retirement). The increase is impressive. This percentage has risen from less than 40% of men over 55 in 1961 to more than 80% in 1995 and from 37% to 66% of women aged 55 and over.

Another way to assess the generosity of benefit payments over time is to consider the evolution of the replacement rate. We use as indicator of gross replacement the ratio of average full career pension over average wage[5].

[5] See Appendix 1.

This is far from giving an accurate picture of what is going on. Hence, we also give on Figure 5 the net replacement rate for a couple with one wage-earner. It is quite higher than the gross rate. In 1994, the gross rate is 0.55 whereas the net rate is 0.85. Wage incomes are subject to high payroll taxes and progressive income taxes whereas pension benefits are hardly taxed (there is an important tax exemption on the income tax and a very small payroll tax). As appears on Figure 5, the net replacement rate was quite steady until 1982 and then increased rapidly. Lately there has been a trend towards taxing retirement income. One can thus expect that the gap between net and gross replacement rates will narrow.

Table 1 provides net replacement rates for alternative cases with respect to wage level and marital status. It clearly appears that the net replacement rate reaches its highest level for households with only one working person and low wage (0.91). Being single (or a household with two working spouses) and earning a high wage imply quite a lower replacement ratio (0.53).

Comparing the time series patterns of LFP and that of net replacement rates yields a mixed picture. On the one hand, there is some negative correlation between the generosity of the program and the labor force participation of men and to a lesser extent of women aged 60-65. But, the correlation is far from being perfect; furthermore, one has to find elsewhere the reasons for the decline in labor force participation of people aged 50-60. As we shall see below, Belgium has over the last decades induced or even forced large number of old workers to retire to yield jobs to the young.

1.2. Labor market behavior in 1995

By focusing on the most recent period, one can get a clearer and more complete picture of the labor market behavior as well as of the generosity of SS and other programs. The age pattern of participation for men and women is depicted in Figure 6. At age 45, the participation rate of men is close to 94%, much higher than that of women (60%). There is then a gradual decline for women; for men, the decline is slow until 52 at which age the pace steepens. Hence, the participation gap closes substantially by age 60. By age 70, participation rates are negligible for both sexes.

Figure 7 considers in more detail the allocation of time among men as they age, by distinguishing alternative statuses vis-à-vis social insurance: (i) employed, (ii) unemployed, (iii) disabled, (iv) benefiting from an early retirement scheme, (v) retired. The bottom line shows the share of men employed. The rate of employment declines after 48 first slowly and at a higher pace after 53; it reaches 50% at age 57. Employment beyond 65 concerns mainly the self-employed.

First, from age 46 to 65, the rate of unemployment appears quite stable. In reality, older workers suffer from unemployment relatively more than younger workers but most of them have been taken out of the unemployment poll above 55. Non employment is also taken care of by disability insurance and particularly mandatory early retirement programs, on which we will come back in Section 2.5. The percentage of retirees below 60 may be surprising (though rather low). Apart from the usual statistical noise found in surveys, a number of unemployed of age 55 and above who are exempted from job search are classified as 'retired'. Naturally, the number of pensioners increases quickly between 60 and 65.

The same exercise is repeated for women in Figure 8. Not surprisingly the rate of employment is much lower than for men. It declines quickly beyond age 60. First, while women above 60 are legally allowed to work, many of them are entitled to full benefits. Second, for women above 60, whatever the number of years of service, unemployment benefits are not available. As they could even draw retirement benefits starting at age 55 until 1992, the share of pensioners in 1995 is still important for women aged 58 and above. Another interesting feature is the share of women in other "statuses", most likely housework.

1.3. Income sources of older persons

Figure 9 graphs the various sources of income of older households. As our data come from the CSB Panel of Belgian Households, the unit is the household and the age is that of the head of the family. We consider the distribution of income across three sources: earnings, social security and maintenance income, capital income including private (occupational) pensions. Private pension income is indeed very small and cannot be distinguished from the return of other financial investments. The predominance of public programs in old people resources is quite striking.

2. Key features of the Belgian social security system[6]

2.1. A complex system

Belgium has three major pension schemes, one for public employees, one for the self-employed and one for employees in the private sector. These schemes are supplemented by a welfare scheme guaranteeing a minimum old age pension and by mandatory early retirement programs. Although these schemes operate under quite different rules for benefits and contributions, they are characterized by heavy government intervention and are financially unfunded.

In addition to what is called the first pillar of pension system, private retirement accounts are also available; they are funded and financed by employers (second pillar) or individual savings (third pillar). These parallel schemes benefit from fiscal advantages but are by no means obligatory. In any case, they have so far been limited in size: assets of private pension funds amount to about 10% of GDP[7] whereas social security pension rights represent more than 250%[8]. Table 2 provides data on average benefits and number of pensioners for the three major social security schemes plus the guaranteed minimum pension and the mandatory early retirement schemes.

---

[6] See also OECD (1994) and de Callatay and Turtelboom (1996).
[7] EEC (1994).
[8] Bouillot and Perelman (1994), OECD (1994).

The private sector employees represent by far the most important category in overall benefits and in number of pensioners. They are the main focus of our study. Civil servants have on average the highest retirement benefits.

2.2. Private sector employees

Employees pensions in the private sector were organized much later than those of the public sector. Prior to 1924, an optional insurance subsidized by the government allowed interested workers to constitute a capital with a savings bank, the CGER. In 1926 a compulsory funded scheme came into effect. After the second world war, this system was gradually replaced, first by a mixed system, then by an exclusively pay-as-you-go system in 1967.

Private sector pensions are financed mainly by payroll taxes and marginally by government transfers (for about 11% of overall benefits). In contrast to benefits, there is no limit on the contributions. Payroll tax rates are 7.5% for the employees and 8.86% for the employers.

Private sector employees can retire between the ages of 60 and 65; they are entitled to a pension provided they have fulfilled two third of a complete career of 45 years, i.e. 30 years of career. The pension is based on three items: salary during the entire career, length of career and an accrual factor that depends on marital status when retired. The pension benefit formula for private sector employees can be sketched by the following equation which assumes no employment history interruption but a career of x (≤ 45) years:

$$B_m = \frac{x}{45} 0.75y \text{ for a household with a single pensioner;}$$

or

$$B_s = \frac{x}{45} 0.60y \text{ for a single or a two-pensioner couple;}$$

where y is the average of earnings duly indexed. In x as in y, years of unemployment or of sickness are accounted for as "years of career."[9,10] Surviving spouses receive B_s; they are treated as singles. [11]

[9] Before 1996, women received a full pension for a 40 year career. They are now subject to the same regulations as men but will enjoy a regime of transition (of 13 years).

There are floors and ceilings: in 1996, the household minimum pension amounts to 56% of average net wages. Pensionable earnings are subject to a rather low ceiling only 20% above average gross wages.

Both pensions and the ceiling are indexed to consumer prices; occasionally, there could be discretionary increases meant to reflect wage growth; the last one was granted in 1991. The frequency of these discretionary increases is unclear. Whether or not they must occur every other year is hardly debated. This is not the only instance when some ambiguity is entertained for political reasons. Minimum pensions are also linked to consumption price index and they regularly benefit from additional increases.

2.3. Public sector pensions

The social security scheme for public employees[12] is the oldest[13]. Pensions are paid out of the general government budget. Public employees are only taxed for the survivor's pension scheme at a 7.5% rate. Civil servants' retirement benefits are viewed as "differed" income.

The mandatory retirement age is 65 for men and women. However, it is possible to opt for an incomplete career and take retirement as from 60. Further, in specific sectors (army, education, ...) the legal age of retirement is 60 or even less.

Pension benefits are the product of three items: the reference salary (average salary of the five years preceding retirement), the number of years of service, and a benefit accrual factor *(tantième)* that ranges from 1/30 for university professors and magistrates to 1/60 for most civil servants. The product of the career length and the accrual factor represents the nominal replacement rate; it cannot exceed 75% of the reference salary.

In addition to this limit, the civil servants' pension cannot exceed an absolute ceiling, about three times average net wages in 1995. There is also a floor equivalent to 56% of mean net wages for a single civil servant and to 70% for a married civil servant. Except for this minimum pension, the household structure does not matter.

---

[10] Before 1992, the pension was reduced by 5% for each year of retirement before this official retirement age.

[11] Survival benefits are prorated with respect to the maximum number of years the late worker could have possibly worked from the age of 20 (some relative maximum and minimum apply however).

[12] This scheme covers civil servants in the federal government, in the regional and local authorities and employees in certain public enterprises.

[13] Based on the law of July 21st, 1844, which covers civil and ecclesiastical pensions.

Finally, public sector pensions are automatically indexed to salaries (*péréquation*); in other words, public sector pensioners share in the economic growth during their retirement.

2.4. Self-employed

A compulsory insurance was set up in 1956 for the self-employed, with proportional contributions giving right to a fixed pension based on the number of years worked. In 1984, this fixed-rate system was replaced by one calculated proportionally on actual earnings. Expenses are covered by individual contributions[14] and an annual government allowance (37% of overall benefits) coming from general revenue.

Pensions can be taken as from age 60, but the pension for men is reduced by 5 per cent annually up to age 65 on top of other rules prevailing in the private sector. Self-employees are in fact still subject to the rules applied to private sector employees before 1992, except that imputed incomes are still used for years prior 1984.

2.5 Fiscal treatment of pension benefits

Direct taxes on social security income are low on Belgium due to the allowance of a large tax deduction. Payroll taxes are very small and only concern very high pensions. The beneficiary of the highest pension benefits in the private sector –if there is no other income– is subject to an average rate of 9.8%. First, note that public sector retirees draw relatively higher benefits and pay much higher taxes. Second, this rate only applies to households without additional sources of income. Appendix III provides some more details about this.

2.6 Mandatory early retirement

Compared to the US and to a lower extent to other EU countries, the Belgian social treatment of elderly workers has two main original features:

- widespread mandatory early retirement plans before 60, the age of eligibility for social security benefits;
- impossibility to work after the legal (mandatory) retirement age, i.e. 65.

The minimum legal age for mandatory early retirement is:

- 60 in case of industries who have not put up a collective agreement (involving employers/employees joint responsibility),

[14] The rate is 16.7% for income below 1.8 million BEF and 12.27% for income above.

- 58 in case of newly concluded collective agreement.

If a collective agreement is reactivated it is allowed to keep a lower minimum age of mandatory retirement than imposed by the current law. The employer is normally required to hire one (usually younger) unemployed per retired worker.

The minimum age for mandatory retirement can be lowered down to 50 in industries experiencing structural problems. These industries are also allowed not to replace the retired worker. This possibility is granted by political decision on a case by case basis.

This rather *ad hoc* system leads to a large variety of mandatory early retirement ages. In any case, however, mandatory early retirement implies that the worker cannot draw social security benefits before the age of 65 (60 for female workers[15]). The worker's benefits are however computed as if the worker had kept his job throughout mandatory retirement years. These schemes are co-financed by employers and the government through unemployment compensations. The employer must pay the worker half the difference between unemployment compensations and the worker's former net wages[16].

Table 3 shows the evolution of mandatory retirement as a percent of population since 1985. Mandatory retirement programs only concern private sector employees. They date back to 1976; their overall importance has been quite steady since 1987. Yet, one can observe over the last five years a slightly contrasting evolution across age groups. Whereas the rate of early retirement between 55 and 59 has been recently declining, that for those aged 60-64 has increased.

Indeed, mandatory retirement is now progressively phased out. The legal minimum age for mandatory retirement in case of new collective agreement has been steadily increased over the last decade from 50 to 58. In 1992, retirement at 60 was made more attractive[17] with a view to switching from mandatory early retirement to so-called "flexible retirement". However, in 1995, mandatory early retirement still represents about 15% of men aged 55-59 and 25% of men aged 60-64.

[15] The difference in the treatment of female and male workers will disappear as the social security rules will be gradually harmonized across genders (1996 reform).

[16] Pensionable earnings are subject to a ceiling and minimum benefits are defined by collective agreement. Fiscal rules are applied but payroll taxes are low and a large deductible is granted.

[17] See the data appendix.

Very few women are concerned by these programs and if they are, they are under 60. The reason is simple: mandatory retirement age for private sector female employees was 60 prior to 1996 and furthermore, early retirement concerned traditional sectors - cool, steel, glass, ... - where the majority of workers are men.

2.7. Guaranteed minimum old age income

The guaranteed minimum old age income started in 1946 but took its full extension in 1969. No personal contributions are required as it is fully financed by the government. It is a means-tested welfare program. This program supplies assistance to all persons who have reached the legal pension age. Looking back at Table 2, one can see that the benefits provided by this scheme are equivalent to 56% of average social security receipts.

2.8. Social Security and the Labor Market

An alternative means of analyzing labor force trends is through the evolution of the hazard rates which provide at each age the percentage increase of labor force retiring from work (relative to the participation rate of workers at the previous age). Figure 10 shows the hazard rate for men. One observes a number of spikes. Those after 65 are not relevant: they concern a very small labor force (negligible denominator) and cannot be accounted for by any feature of the SS system. The increase in labor force leaving at age 60, which is the age of eligibility for social security, is striking. The spike at age 65 corresponds to the mandatory retirement constraint. The spike at age 58 coincides with the standard age of mandatory early retirement.

In Figure 11, the hazard rate for women is plotted. Focusing again on the relevant spikes, we note that the most pronounced corresponds to age 60, the mandatory retirement age for private sector female employees before 1996. The spike at 65 concerns the civil servants who retire at that age. Before 1992, women were eligible for early retirement between 55 and 60[18]; this, combined with mandatory early retirement schemes, can explain the small spike at age 58. Finally, Pepermans (1992) has shown that women in Belgium tended to retire at the same

[18] Albeit with 5% of benefit reduction per year of anticipation on top of the current prorating, *i.e.* the same system as that applied to men before 1992.

year as their husbands, that is, on average three years younger than them.

2.9. The future

Will Belgium with publicly-financed social security, operating entirely on a pay-as-you-go basis, be able to finance it in the first-half of the next century? This question is clearly at the heart of political debate in Belgium as in many other countries. To answer it, two approaches have been used.

The first consists in assessing the commitments to which the system is subject, that is the present value of current and future benefits and contributions.

- Gross commitments -the mirror view of the social security wealth of all workers- have risen from 164.4% of GDP in 1961 to 292.5% of GDP in 1985 and will amount to 388.8% of GDP in 2040 according to Bouillot and Perelman (1994). These authors measure gross commitments as the present value of the rights living generations have acquired proportionally to their careers. This stance corresponds to an important characteristic of the Belgian social security system, the so-called "defined benefits".
- Taking another point of view, the OECD (1994) estimates the present value of future pension expenditures in 1990 to be equal to 571% of GDP. On the other hand, the present value of future contributions *ceteris paribus* would only represent 406% of GDP, thus leaving Belgium with net commitments staggering to 165% of GDP in 1990.

The second approach consists in projecting the annual increase in pension benefits under the assumption that the replacement rate is kept constant. Under plausible hypotheses private sector pension expenditures that represent about 6.6% of GDP would jump to about 11% by 2030 according to the Belgian Planning Bureau (Englert *et al.*, 1994). Note that these figures do not encompass the civil servant pensions. This introduces a downward bias as former public sector employees are known to be bound to constitute a growing share of retirees in the future. Indeed, in a recent study, de Callatay and Turtelboom (1996) show in their baseline projection that the public sector pension benefits would more than double as a percent of GDP from 1995 to 2030.

Among the reform options debated, an increased participation of the older workers is often highlighted. As de Callataÿ and Turtelboom (1995) write:
"Labor market participation in Belgium is currently so low -and, correspondingly, the elderly dependency ratio so high- that any return to labor market participation and unemployment rates seen in other industrialized countries will soften the demographic impact on pension expenditures. This underscores the critical contribution to the public finances that could be made by policy measures that would strengthen labor market performance in Belgium over the coming years."[19]

3. Retirement incentives

In this section, we use a simulation model aimed at assessing the incentives of social security on retirement.[20] We first focus on social security *per se*, which only provides benefits at age 60. However, Section 3.3 investigates the case of a worker who is entitled to unemployment benefits.

3.1. Base case results

Table 4 shows our base case results. Our base case worker was born in 1930. Having begun to work at the age of 20, his career will be complete (45 years) in 1995. His wage profile is given in Figure A1 in the Appendix. He is entitled to social security benefits from 1990 on, *i.e.* when he reaches the age of 60. His wife is three year younger and has never worked. He has no more dependent children and is receiving standard fiscal deductions.

Consider first the replacement rate column. From 55 to 59, pension benefits are not available but payroll taxes must, of course, be paid in case of continued work. At 60, the first year of possible claiming, the replacement rate is roughly 75%. The level of pension increases between 60 and 64 because of career completion and between 65 and 69 because low earnings years are replaced by higher earning years. This explains the over-time profile of the replacement rate. Note that at 65, it is equal to 0.863 and close to the one given on Figure 5 and Table 1[21]. The next three columns show the evolution of SSW. Additional year of work affects the computation of SSW in five ways:

[19] de Callatay and Turtelboom (1996), p.30.
[20] The methodology is described in the Chapter by Diamond and Gruber.
[21] There is a 6% difference between our results and those of EUROSTAT. That comes from the fact that the reference for wages is the median for us and the mean for EUROSTAT.

(i) payroll taxes are paid: negative effect;
(ii) as long as the career is less than 45 years, benefits are increased by a factor of 1/60[22]: positive effect;
(iii) an additional year of work can replace a previous low earnings year: positive effect;
(iv) an additional year of work at age 60 and beyond implies fewer years over which benefits can be claimed: negative effect;
(v) there is always some chance that the worker will die and his spouse also: negative effect.

These five effects operate differently between 55 and 59, between 60 and 64 and over 64.

	i	ii	iii	iv	v
55-59	-	+	0	0	0
60-64	-	+	0	-	-
65+	-	0	+	-	-

The period 60-65 is a period during which the system is actuarially unfair. Working one additional year brings a gross benefit increase of $1/45^{th}$ times 0.75 for a couple for all coming years but a loss of a full year pension benefit. It is therefore not surprising that during this period the SSW decreases at a rather high pace. Naturally beyond 65, when the work career is complete, the decline in SSW is even faster. One must add that very few people have the opportunity of working beyond 65; in other words, there is no real choice beyond that age.

Between 55 and 59, the above effect (ii) dominates (i). Consequently, SSW moderately increases and workers are subject to small subsidy rates. Therefore, one cannot solely rely on Social Security incentives to explain job leaves between 55 and 59. In Belgium, most cases of retirement between 55 and 59 are induced by existing social insurance schemes: unemployment, disability, sickness, ... We come back to this in Section 3.3. Of course, mandatory early retirement also plays here an important role as explained above.

Above 60, the accrual rate steadily decreases from -5% to -7% with a corresponding tax rate turning around 50%. This shock is explained by the sudden availability of benefits with an increasing mortality. Working at the age of 65 corresponds to the largest negative accrual since above that age, the above effect (iii) is the only potentially positive effect on SSW.

[22] That is 0.75 x 1/45.

3.2. Other cases

Table 5 explores the same questions for a single worker. In this case, payroll taxes are the same as before but the expected benefits are lower. The theoretical gross replacement rate for a married couple is 0.75 and for a single person it is only 0.60. Further, life expectancy of a 3-year younger wife exceeds that of her husband by 7 years. It is therefore not surprising that both SSW and replacement rates are consistently lower for a single worker than for a married couple with a working husband. Thus, beyond 55 additional work is hardly subsidized. Beyond 60, tax rates are consistently higher than for married workers. It is striking to compare the levels of SSW across these two tables. It reveals a quite high implicit tax imposed on single male workers.

Table 6 considers an alternative earnings history. We assume that the worker started to work at age 25 so that he has an incomplete earnings history until he reaches the age 70. We assume that he contemplates working that long even though we know that in Belgium this is almost impossible. With such an history, before age 60, there is an important work subsidy and at age 60 and after, the tax for working one more year is lower than in the base case calculation.

In Table 7, we present a summary of the results obtained under alternative assumptions as to lifetime earnings, discount rate, survival probability and gender age-gap. Not surprisingly these assumptions lead to expected differences in terms of replacement rate and social security wealth. For example, with an older wife or with higher mortality risk, SSW is lower; with higher lifetime income, the replacement rate is lower and social security wealth is higher. Yet, the tax rate is relatively steady for all these cases; it ranges from 0.382 (incomplete history) to 0.583 (10th percentile). Figures 12-16 present the tax-subsidy age profile for these alternative assumptions.

3.3. Incentive computations for a worker entitled to unemployment benefits[23]

Entitlement to unemployment benefits is available to workers in case of (involuntary) lay off. It has consequences both in terms of replacement income and in terms of pension rights. We have taken UI net replacement rates directly from Martin (1996). Table 8 summarizes results of interest for this paper. Years of unemployment benefits are

[23] We have chosen unemployment compensation as replacement income. We could have instead chosen early mandatory retirement or disability benefits. But, in general mandatory early retirement is not chosen voluntarily by nature and implies retirement at 65. Disability benefits are in principle subject to some screening.

fully taken account for pension computation. Besides, the worker is imputed his last wages for these years.

Tables 9 presents the base case results (corresponding to Table 4) while assuming the worker is entitled to unemployment benefits. Only rows corresponding to last year of work 54-58 change since once pension benefits are available, workers are assumed to opt for them if they stop to work. The observed increase in SSW stems from the accounting of unemployment benefits. One also observes that between 55 and 59, there is an important tax on continued work. Indeed, the worker now forgoes UI benefits while his pension rights are left almost unchanged whether he works or not.

Figure 17 contrasts tax/subsidy rates with and without unemployment benefits for the base, single and incomplete career cases. Single workers face lower tax rates between 54 and 58 since UI net replacement rates are lower for them. However, at 59, this worker is imposed a higher tax rate on further work as singles have a 79% net replacement rate on their first year of unemployment. Naturally, a worker whose career can be completed faces a lower tax rate on continued work than the base case worker.

Figure 18 investigates the same issue while varying income level. Interestingly, the lower the income level the higher tax rate on continued work. Indeed, workers with higher wages still see their SSW increase thanks to real wage growth while lower wage earners have hit the minimum pension threshold and are imputed years of career anyway.

What can be concluded from these results? Once a worker has been laid off, he is given very few monetary incentive to get back to work. Indeed, for low income (first decile) workers, tax rates between 54 and 59 are around 100 per cent! This reflects again the pervasive policy lead

by Belgian governments to push older workers out of labor force, even prior to the legal age of retirement. However, these figures should not be used to explain why one would wish to voluntarily leave labor force.

CONCLUSION

Belgium social insurance and in particular its treatment of retirement age is at the crossroads. On the one hand, because of huge youth unemployment, the government tends to force workers out of the labor market earlier than elsewhere. At the same time, retirees and early retirees enjoy a level of welfare equivalent if not higher than other age classes.

On the other hand, population aging implies that social security expenditures would double by 2040 if the replacement ratio is kept constant and mandatory retirement age maintained at its current level. Irrespective of the forecast methods used, Belgium will face with steeply rising social expenditure on retirement and health care. Although such an outlook is more or less the same in other European countries, the problem in Belgium is aggravated by the marked size of compounded public debt.

References

Bouillot, L., S. Perelman. 1995. "Evaluation Patrimoniale des Droits à la Pension," Revue Belge de Sécurité Sociale, 4(3), Brussels: Ministère des Affaires Sociales, de la Santé Publique et de l'Environnement, pp. 803-831.

de Callatay, E. & B. Turtelboom. 1996. "Pension reform in Belgium," IMF Working Paper, 96/74, Washington D.C: International Monetary Fund.

Delhausse, B., Perelman, S. & P. Pestieau. 1996. "Retirement and growing old: which model of protection ?," in E. Reynaud, L. Roberts, B. Davies, and G. Hugues , eds, International Perspective on Supplementary Pensions. Actors and Issues, London: Quorum Books, pp. 137-150.

Diamond, P. and J. Gruber. 1997. "Social security in the US," this volume.

EEC. 1994. "Supplementary pension in the European Union," Development Report by the European Commission's Network of Experts on Supplementary Pensions, Brussels.

Englert, M., Fasquelle, N. & S. Weeman. 1994. "Les perspectives d'évolution à très long terme de la sécurité sociale (1991-2050)," Planning Paper, 66, Brussels: Planning Bureau.

Luttgens, A. & S. Perelman. 1987. "Public pensions, health status and other determinants of retirement: a case study on Belgian aged workers," University of Liège, mimeo.

Martin, J. 1996. "Indicateurs de Taux de Remplacement aux Fins de Comparaisons Internationales," Revue Economique de l'OCDE, 26/I, Paris: OECD Press, pp. 116-132.

OECD. 1994. OECD Economic Survey: Belgium, Luxembourg, Paris: OECD Press.

Pepermans, G. 1992. "Retirement decision in a discrete choice model and implications for the government budget: The case of Belgium," Journal of Population Economics, Munich: Selapo, University of Munich, pp. 229-243.

Stijns, J.-Ph. 1996. "Generational accounts for Belgium," forthcoming in Generational Accounting around the World, Kotlikoff et Auerbach eds., Chicago: University of Chicago Press.

APPENDIX

1. Data appendix

Historical data

1) Historical Trends in LFP of Older Men / Women (Figures 1 and 2).

Source : Institut National de Statistique, decennial census until 1981; Institut National de Statistique, Labor Force Survey from 1983 until 1995.

2) Social Security, Disability Insurance and Mandatory Retirement receipts of Older Men / Women (Figures 3 and 4).

Source : Bouillot and Perelman (1994), own computations.

Results come from administrative data. Percentages have been adjusted so that : the percentage of population receiving Social Security or Disability Insurance or Mandatory Retirement compensation (males and females) corresponds to that given by the Labor Force Survey in 1993. Note that from 1961 until 1987, actual data (see below) have been used; from 1988 up to 1995, the Belgian Federal Planning Bureau's projections are reported, after the above-mentioned adjustment.

Data :

Pension outlays and number of pensioners (private sector): Office National des Pensions (ONP), *Statistique annuelle des bénéficiaires de pension.*
Number of pensioners (public sector): Ministère de la Prévoyance Sociale, Annuaire Statistique de la Sécurité Sociale.
Breaking-up by age of pensioners: (private sector) Institut National de Maladie Invalidité (INAMI), *Rapport Général* (troisième partie, Rapport Statistique); (minimum guaranteed income to the elderly [welfare]) Office National des Pensions, *Statistique annuelle des bénéficiaires de pension.*
Total population: Institut National de la Statistique, *Statistiques Démographiques.*
Number of Mandatory Retired: Office National pour l'Emploi (ONEM).

3) Social Security Replacement Rates over Time – Gross and Net Replacement Rates (Figure 5).

Source: own computations.

Mean gross pension receipts have been computed for a worker with a complete career on the year of his/her retirement. This mean pension is a weighted average of single and married pension earners. Mean gross wages of private sector workers (thus including independent workers) have been computed. The ratio of these two means defines our gross replacement rate.

Our net replacement rate corresponds to the ratio of mean net pension receipts over mean net wages. Taxes on replacement earnings (A.M.I.) have been accounted for. Payroll taxes as well as income taxes have been deduced from mean gross wages. Income taxes have been computed using the average tax rate.

Data:

Average income tax rate: Institut National de la Statistique., *Statistiques financières*, Statistique fiscale des revenus soumis à l'I.P.P.
Average pension receipts for a complete career: Office National des Pensions, *Statistique annuelle des bénéficiaires de pension.*
Average wages and payroll taxes: Office National de la Sécurité Sociale, *Rapport annuel.*

Contemporaneous Data

General remarks

Most data comes from the Labor Market Survey conducted in Belgium by the Institut National de Statistique (INS), and published by EUROSTAT. The following main distinctions apply:

- Computations related to labor force participation (e.g. Figure 6) have been undertaken using the ILO definitions:

Working active :
- Had a paid job for at least one hour during the week of survey
- Accomplished non-paid help in the family company or farm.

Unemployed :

- Has no job (i.e. has worked less than an hour during the week of survey).
- Is actively seeking a job.
- Is available for working within the 15 days following the interview.

Active : working active or unemployed
Note that this classification proceeds from subjective answers.

- The following categories of (in)activities (Figures 7 & 8) are distinguished : employed, unemployed, disabled, mandatory early retired, retired and "other". Here, the surveyed person determines which category best describes her/himself with regards to the labor market. Therefore adding up the employed and unemployed will not necessarily give back what the ILO definitions imply.

The Labor Market Survey is lead so that for characteristics concerning more than 5% of the active population, the standard deviation at the NUTS 2 (regional) level does not exceed 8% (taking account of the sampling for unemployment). Numbers regarding smaller groups have to be considered with some care, as in the case of *age-to-age* specific figures[24].

a) Labor Market Participation Rates by age and sex in 1995 (Figure 6) and Distribution of Activities of Men and Women by age in 1995 (Figures 7 and 8).

Source: Institut National de la Statistique (INS), *Labor Force Survey*, 1995

b) Breakdown of Source of Family Income (Figure 9)

Source : own computations.

Series have been smoothed with a (6th degree) polynomial.

Data : Household Survey, Center for Social Policy, UFSIA, Antwerp, Belgium – own computations

c) Hazard Rate out of Labor Force for Men and Women (Figures 10 and 11).

[2424] Number of answers in each year sample: 92' survey: 77,689; 93' survey: 81,219; 94' survey: 81,281; 95' survey: 80,319. The rate of non-answer is about 10%. Non-answers are not accounted for.

Source: Institut National de la Statistique (INS), *Labor Force Survey*, 1992-95 (same remark as in a) above)

Three pair of years have been used : 95-94, 94-93, and 93-92. The mean hazard rate over these years is reported while substituting a 0 in case of negative hazard rate. The purpose of this is to eliminate cohort effects from labor market data and get rid of negative hazard rates.

Studying retirement incentives in Belgium

a) Simulations (Figures 12 – 18)

Earnings patterns come from Figure A.1.
Note that we have assumed in our computations that SS benefits, once granted, are indexed to the CPI. Since January 1976, there are no longer indexed to wage-growth (this is in contrast to the system prevailing for public sector employees, the so-called « péréquation »). Limited discretionary increases were granted in 1990 and 1991. There is no particular reason to believe that this will happen again in the near future.

We have decided to present a consistent social security system throughout years for our simulations. Recall that in our case study approach, our worker is supposed to be 65 in 1995. In the Belgian system, he is hence allowed to retire between 1990 and 1995. In fact public policy has been different prior and after 1992:

- In Belgium, past income record is indexed to CPI but also adjusted to wage-growth on a discretionary basis. However, since 1992, there has been no adjustment yet. Note that this wage-growth adjustment has played a role for 1990 and 1991, i.e. for workers on their 60 and 61st birthday. We have left out of our analysis this potential incentive to delayed retirement.
- However, during these very two years, the former system still prevailed where pension receipts were reduced by 5% per year of anticipation. This factor played in the converse way, by providing incentives for early retirement. We have also left out of our analysis this potential incentive to early retirement.

We may expect, on the whole, these two factors to have counter-balanced each other.

Further, as explained above, benefits are capped with respect to the income stream to be considered. This ceiling is itself adjusted to the CPI and also to wage-growth on a discretionary basis. Again, since 1992,

there hasn't been such adjustment. We have, in the same spirit as above, voluntarily neglected, this factor for 1990-91. At the time of writing, some automatic adjustment mechanism is being introduced. It does not concern, however, our period of investigation.

These three conventions are rather natural in the case Belgium. Indeed, de Callataÿ and Turtelboom (1996 and 1997) rely on the same hypotheses. This, in fact, enables us to lead all our computations in real terms, rather than jeopardizing on the future real and nominal growth rate as well as on the share of growth that the labor factor will be able to capture.

Benefit computation is in fact based on gross earnings. We have therefore used the Belgian income tax rules in 1992 to convert back net monthly earnings into gross yearly income. Net monthly income was obtained anew while using the 1992 fiscal rules as an approximation. Indeed, fiscal rules have not been indexed during the scope of our investigation.

2. Comparing with other countries

One of the main motivations for early retirement is fighting unemployment. Table A.1 provides rate of participation for men aged 55-64 and the rate of unemployment in a number of OECD countries. One sees that countries with high unemployment rates tend to have low participation rates of elderly workers. This evidence can be interpreted two ways. First, it can imply that early retirement policy does not work. Second, it could just say that without such a policy unemployment would be higher.

3. Earlier studies on flexible retirement in Belgium

Luttgens and Perelman (1987) study the retirement behavior of a sample of male blue-collar workers, having reached age 60 during the period 1973-77. During that period, a full career worker with z years of career gets a yearly pension equal to $y\frac{45-z}{45}\times\left(1-\frac{5z}{100}\right)$ of the pension he would get retiring at age 65. Luttgens and Perelman show that social security did not have a significant influence on early retirement

decision and justify their result by the actuarial neutrality of social security.

More recently, Pepermans (1992) addresses the same problem using a sample of individuals aged 50 to 70 in 1985. On the basis of his model, he computes the relevant probability for a typical worker (male, married, non working spouse) to retire before 65, the legal retirement age: 0.196 at 60, 0.396 at 63, 0.917 at 65. There is a clear bias in his study as in that period most early retirees did not choose to be so. As noted above since 1991, voluntary early retirement has been made more attractive.

4. Average tax rate for private sector retirees.

Table A.2 provides the average tax rate on social security benefits for a couple with a single earner. There are three components: a health care payroll of 3.55%; a "solidarity" income tax of at most 2%; and the personal income tax that can be very high (the marginal rate is 25%). However, for those whose reported income is restricted to social security benefits, there is a tax exemption amounts that to about 90% of mean household income.

Table A.2 also shows that the exemption amounts to 130% of the minimum household pension. The average tax rate on the maximum private sector pension is lower than 10%. A pension in between the min and the max is taxed at 4%. Note, however, that these reasonable tax rates hold for pensioners who are relying solely on social security. Though, as has been shown in Section 1.3, this is a reasonable assumption for most aged people, we can conjecture than pensioners receiving high social security benefits may in fact be subject to higher tax rates due to additional sources of income.

Table 1: Net rates of replacement in 1991

	Complete career					
Workers in the households*	Two			One		
Wage ratio to average wage	x2/3	x1	x2	x2/3	x1	x2
Replacement ratio (%)	81	73	53	91	80	60

Source: EUROSTAT (1992).

* The rate is the same for a single and for a married person whose spouse works as well.

Table 2
Categories of pensions schemes
(1995)

	Benefits as% of GDP (1000)	Number of pensioners* (1000)	Average amount in relative terms
Private sector employees	5.72	1347	87.3
Self-employed	0.71	246	59.1
Mandatory early retirement	0.64	128	102.8
Minimum old age pensioners	0.14	50	56.7
Public sector employees	3.38	405	170.7
All schemes	**10.59**	**2175**	**100.0**

* Including surviving spouses. There is the possibility of double-counting.

Source: Bouillot and Perelman (1994), own calculations.

Table 3: Early Retirement in per cent of age group population

a. 55 – 64	85	86	87	88	89	90	91	92	93	94	95
Men	7.24	5.79	9.59	10.10	10.48	10.93	10.93	10.74	10.78	10.71	10.42
Women	1.12	0.81	1.64	1.71	1.73	1.74	1.67	1.51	1.35	1.22	1.19
Total	4.10	3.06	5.52	5.81	6.01	6.25	6.22	6.05	6.00	5.91	5.76

b. 55-59	85	86	87	88	89	90	91	92	93	94	95
Men	11.57	13.78	15.19	15.58	15.86	16.46	16.15	15.15	15.42	15.64	15.49
Women	2.53	3.33	4.10	4.43	4.58	4.74	4.81	4.60	4.43	4.22	4.15
Total	6.91	8.41	9.49	9.85	10.08	10.45	10.35	9.76	9.82	9.82	9.72

c. 60-64	85	86	87	88	89	90	91	92	93	94	95
Men	16.82	18.80	20.50	21.49	22.54	23.86	24.59	25.53	26.01	26.50	26.52
Women	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.93	8.84	9.65	10.16	10.68	11.32	11.68	12.16	12.40	12.67	12.70

Source: O.N.E.M.

Table 4: Base Case Incentive Calculations

Last Year of Work	Replace-ment Rate	SSW*	Accrual*	Accrual Rate	Tax/ Subsidy
54	--	4,193,746	0	0	0
55	--	4,247,922	54,176	0.013	-0.129
56	--	4,304,178	56,256	0.013	-0.134
57	--	4,365,004	60,826	0.014	-0.145
58	--	4,427,306	62,302	0.014	-0.148
59	0.749	4,493,147	65,841	0.015	-0.157
60	**0.771**	**4,285,110**	**-208,037**	**-0.046**	**0.496**
61	0.794	4,076,567	-208,543	-0.049	0.497
62	0.817	3,870,541	-206,026	-0.051	0.491
63	0.839	3,665,171	-205,370	-0.053	0.489
64	0.863	3,466,790	-198,381	-0.054	0.473
65	0.874	3,244,903	-221,888	-0.064	0.529
66	0.882	3,027,124	-217,779	-0.067	0.519
67	0.890	2,827,248	-199,876	-0.066	0.476
68	0.898	2,632,906	-194,342	-0.069	0.463
69	0.905	2,448,357	-184,549	-0.070	0.440

* In this table as in the following, both SSW and ΔSSW (accrual) are in BEF ($1 ≈ 32BEF).

Table 5: Incentive Calculations – Single Worker

Last Year of Work	Replace-ment Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	--	2,742,452	0	0	0
55	--	2,740,106	-2,346	-0.001	0.006
56	--	2,740,954	848	0.000	-0.002
57	--	2,744,944	3,990	0.001	-0.010
58	--	2,752,092	7,148	0.003	-0.017
59	0.696	2,762,366	10,274	0.004	-0.024
60	**0.713**	**2,531,229**	**-231,137**	**-0.084**	**0.551**
61	0.726	2,283,319	-247,910	-0.098	0.590
62	0.736	2,030,821	-252,498	-0.111	0.601
63	0.746	1,785,965	-244,857	-0.121	0.583
64	0.756	1,548,965	-237,000	-0.133	0.564
65	0.756	1,292,551	-256,414	-0.166	0.611
66	0.756	1,049,869	-242,681	-0.188	0.578
67	0.756	820,740	-229,129	-0.218	0.546
68	0.756	604,909	-215,832	-0.263	0.514
69	0.756	402,269	-202,640	-0.335	0.483

Table 6: Incentive Calculations - Incomplete Earnings Profile

Last Year of Work	Replace-ment Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54	--	3,414,293	0	0	0
55	--	3,475,489	61,196	0.018	-0.146
56	--	3,537,615	62,126	0.018	-0.148
57	--	3,600,628	63,013	0.018	-0.150
58	--	3,664,527	63,899	0.018	-0.152
59	0.609	3,729,189	64,662	0.018	-0.154
60	**0.626**	**3,568,662**	**-160,527**	**-0.043**	**0.382**
61	0.644	3,408,441	-160,221	-0.045	0.382
62	0.661	3,249,660	-158,781	-0.047	0.378
63	0.679	3,092,053	-157,607	-0.048	0.375
64	0.696	2,951,595	-140,458	-0.045	0.335
65	0.713	2,819,284	-132,311	-0.045	0.315
66	0.731	2,689,043	-130,240	-0.046	0.310
67	0.748	2,566,851	-122,192	-0.045	0.291
68	0.766	2,444,245	-122,606	-0.048	0.292
69	0.783	2,327,145	-117,100	-0.048	0.279

Table 7: Incentive Calculations – Summary of Other Cases Last Year of Work is Age 59

Case	Replace-ment Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
Base Case	0.771	4,285,110	-208,037	-0.046	0.496
Single Worker	0.713	2,531,229	-231,137	-0.084	0.551
Diminishing Earnings	0.764	3,802,341	-219,650	-0.055	0.535
Incomplete History	0.626	3,568,662	-160,527	-0.043	0.382
10th pctile	0.894	3,919,982	-195,212	-0.047	0.583
90th pctile	0.695	5,420,567	-372,833	-0.064	0.564
Discount = 6%	0.771	2,345,182	-195,993	-0.077	0.467
Discount = 1%	0.771	6,229,508	-195,272	-0.030	0.465
Higher Mort. Risk	0.771	3,831,585	-207,276	-0.051	0.494
Lower Mort. Risk	0.771	4,651,405	-195,056	-0.040	0.465
Wife Born 1927	0.771	3,684,036	-212,455	-0.055	0.506
Wife Born 1939	0.771	4,608,155	-195,316	-0.041	0.465

Table 8: Net Replacement Rates with Unemployment Benefits

(1994/5)

	Single	Married*
First Year	79%	70%
Following years	55%	64%

Source: Martin (1996)

* Spouse not working

Table 9: Base Case Incentive Calculations
Worker entitled to Unemployment Benefits

Last Year of Work	Replace-ment Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		6,173,342	0	0	0
55		5,828,691	-344,651	-0.056	0.821
56		5,488,842	-339,849	-0.058	0.809
57		5,157,398	-331,444	-0.060	0.789
58		4,833,646	-323,752	-0.063	0.771
59	0.749	4,493,147	-340,500	-0.070	0.811
60	**0.771**	**4,285,110**	**-208,037**	**-0.046**	**0.496**
61	0.794	4,076,567	-208,543	-0.049	0.497
62	0.817	3,870,541	-206,026	-0.051	0.491
63	0.839	3,665,171	-205,370	-0.053	0.489
64	0.863	3,466,790	-198,381	-0.054	0.473
65	0.874	3,244,903	-221,888	-0.064	0.529
66	0.882	3,027,124	-217,779	-0.067	0.519
67	0.890	2,827,248	-199,876	-0.066	0.476
68	0.898	2,632,906	-194,342	-0.069	0.463
69	0.905	2,448,357	-184,549	-0.070	0.440

Table 10: Incentive Calculations – Single Worker
Worker entitled to Unemployment Benefits

Last Year of Work	Replace-ment Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		4,371,072	0	0	0
55		4,050,244	-320,828	-0.073	0.764
56		3,738,690	-311,553	-0.077	0.742
57		3,434,903	-303,788	-0.081	0.724
58		3,144,095	-290,808	-0.085	0.693
59	0.696	2,762,366	-381,729	-0.121	0.909
60	**0.713**	**2,531,229**	**-231,137**	**-0.084**	**0.551**
61	0.726	2,283,319	-247,910	-0.098	0.590
62	0.736	2,030,821	-252,498	-0.111	0.601
63	0.746	1,785,965	-244,857	-0.121	0.583
64	0.756	1,548,965	-237,000	-0.133	0.564
65	0.756	1,292,551	-256,414	-0.166	0.611
66	0.756	1,049,869	-242,681	-0.188	0.578
67	0.756	820,740	-229,129	-0.218	0.546
68	0.756	604,909	-215,832	-0.263	0.514
69	0.756	402,269	-202,640	-0.335	0.483

Table 11: Incentive Calculations
– Incomplete Earnings Profile
Worker entitled to Unemployment Benefits

Last Year of Work	Replace-ment Rate	SSW	Accrual	Accrual Rate	PE	Tax/ Subsidy
54		5,312,097	0	0	419841	0
55		4,983,382	-328,715	-0.062	419,841	0.783
56		4,663,627	-319,755	-0.064	419,841	0.762
57		4,351,954	-311,673	-0.067	419,841	0.742
58		4,051,148	-300,806	-0.069	419,841	0.716
59	0.609	3,729,189	-321,959	-0.079	419,841	0.767
60	**0.626**	**3,568,662**	**-160,527**	**-0.043**	**419,841**	**0.382**
61	0.644	3,408,441	-160,221	-0.045	419,841	0.382
62	0.661	3,249,660	-158,781	-0.047	419,841	0.378
63	0.679	3,092,053	-157,607	-0.048	419,841	0.375
64	0.696	2,951,595	-140,458	-0.045	419,841	0.335
65	0.713	2,819,284	-132,311	-0.045	419,841	0.315
66	0.731	2,689,043	-130,240	-0.046	419,841	0.310
67	0.748	2,566,851	-122,192	-0.045	419,841	0.291
68	0.766	2,444,245	-122,606	-0.048	419,841	0.292
69	0.783	2,327,145	-117,100	-0.048	419,841	0.279

Table A.1.
Labor participation and unemployment

	Rate of participation Men age 55-64		Rate of unemployment
	1979	1994	1995
USA	70.8	62.6	5.5
Japan	81.5	81.2	3.1
Germany	63.2	45.0	8.2
France	67.0	39.1	11.6
Italy	36.8	30.7	12.2
United-Kingdom	70.2	64.5	8.7
Belgium	44.5	33.0	9.4
Netherlands	63.2	40.7	6.5
Spain	73.8	48.6	22.7
Sweden	77.8	68.8	9.2

Source: OECD, 1996.

Table A.2.: Aggregate taxation rate on Social Security benefits

(all numbers in percent)

	Relative gross amount	Global Taxation Rate	Relative net amount
Maximum Pension*	168	9.8	152
(Floor + Max) / 2	134	4.0	129
Highest Zero Tax Pension	127	0.0	127
Floor*	**100**	**0.0**	**100**

* married worker having received ceiling-wages from 20 to 64

* married worker with a complete career (45 years)

Source: own calculations

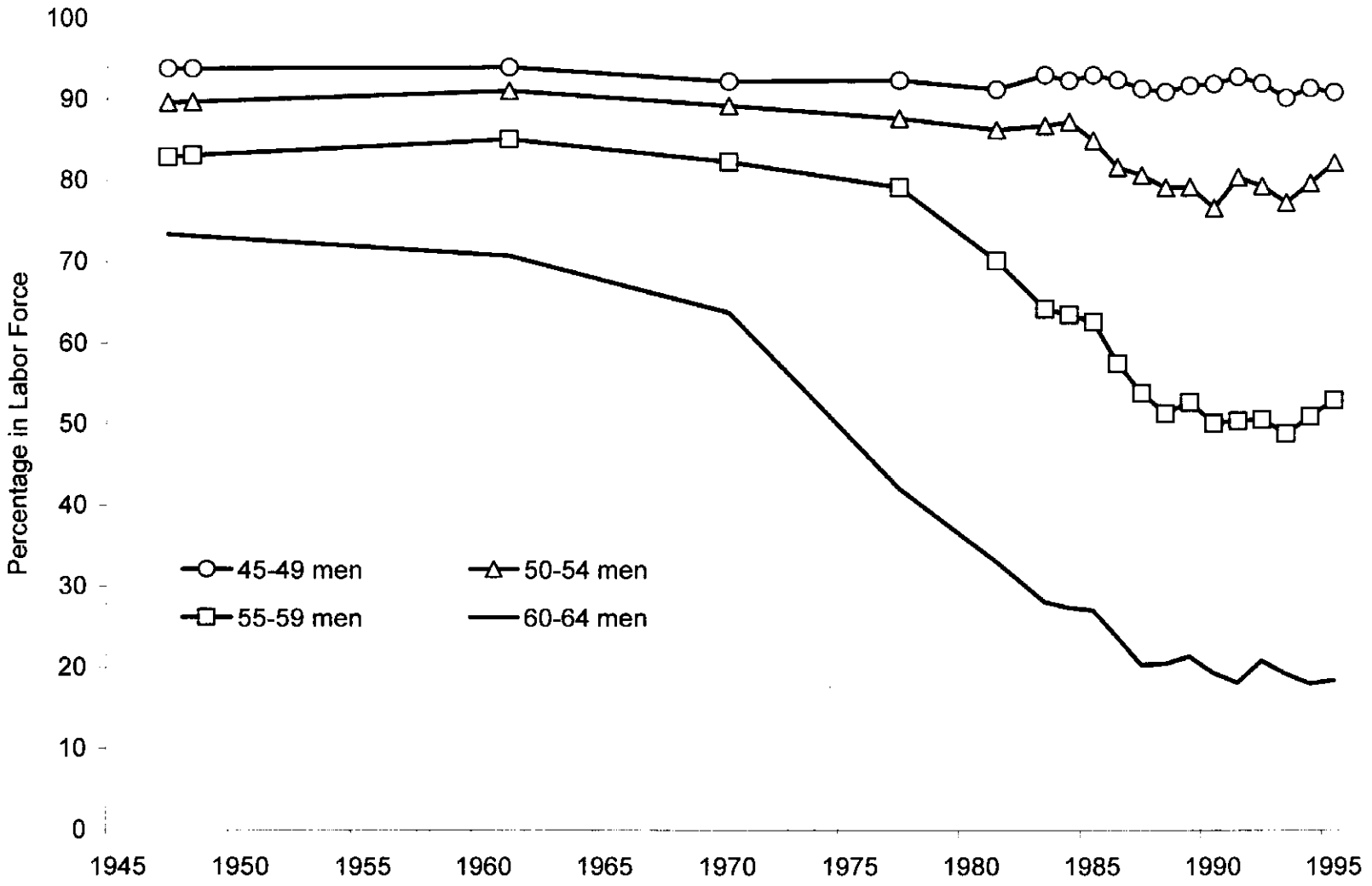

Figure 1: Historical Trends in LFP of Older Men
Source: Federal Planning Bureau; I.N.S

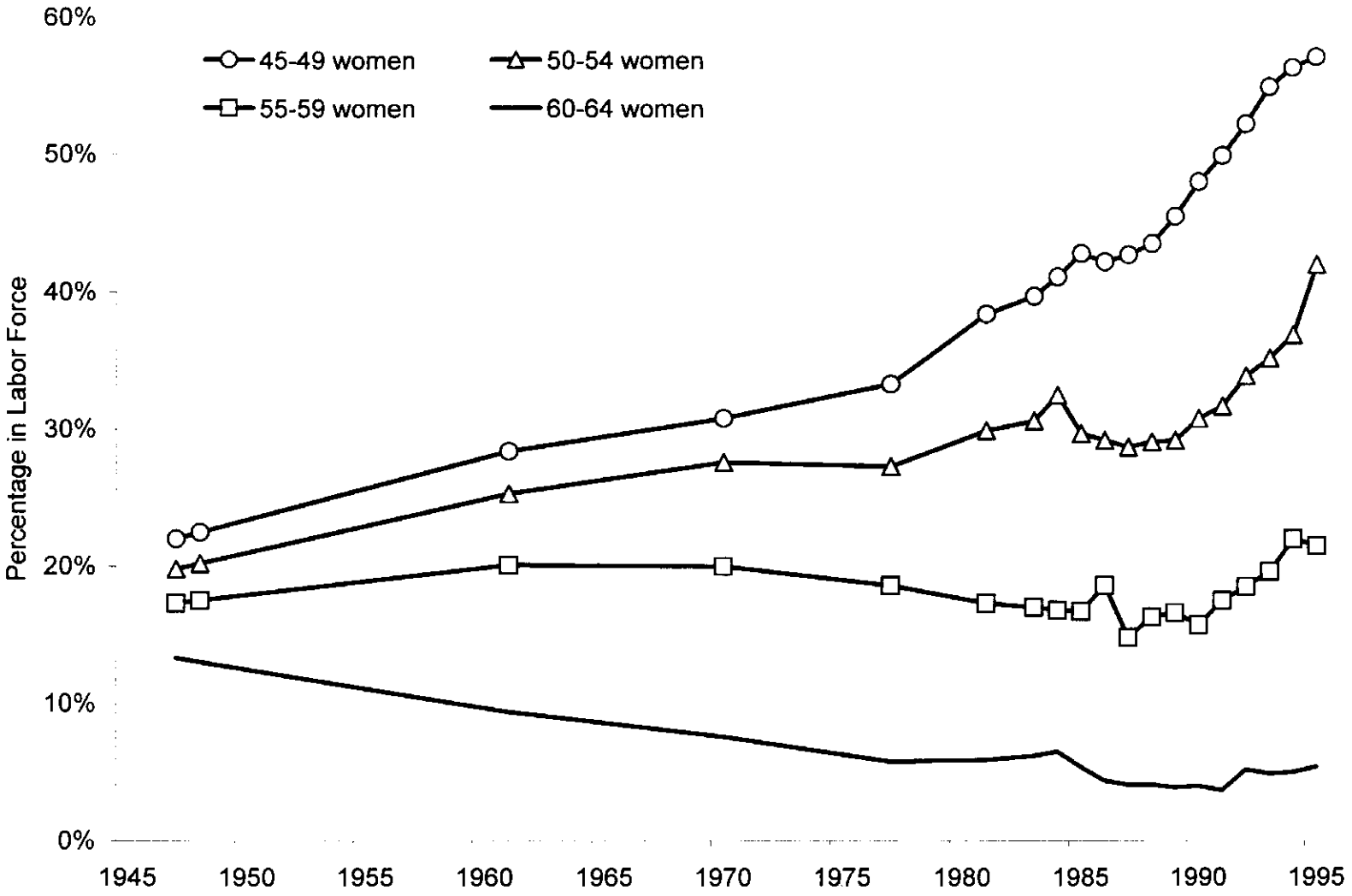

Figure 2: Historical Trends in LFP of Older Women
Source: Federal Planning Bureau; I.N.S

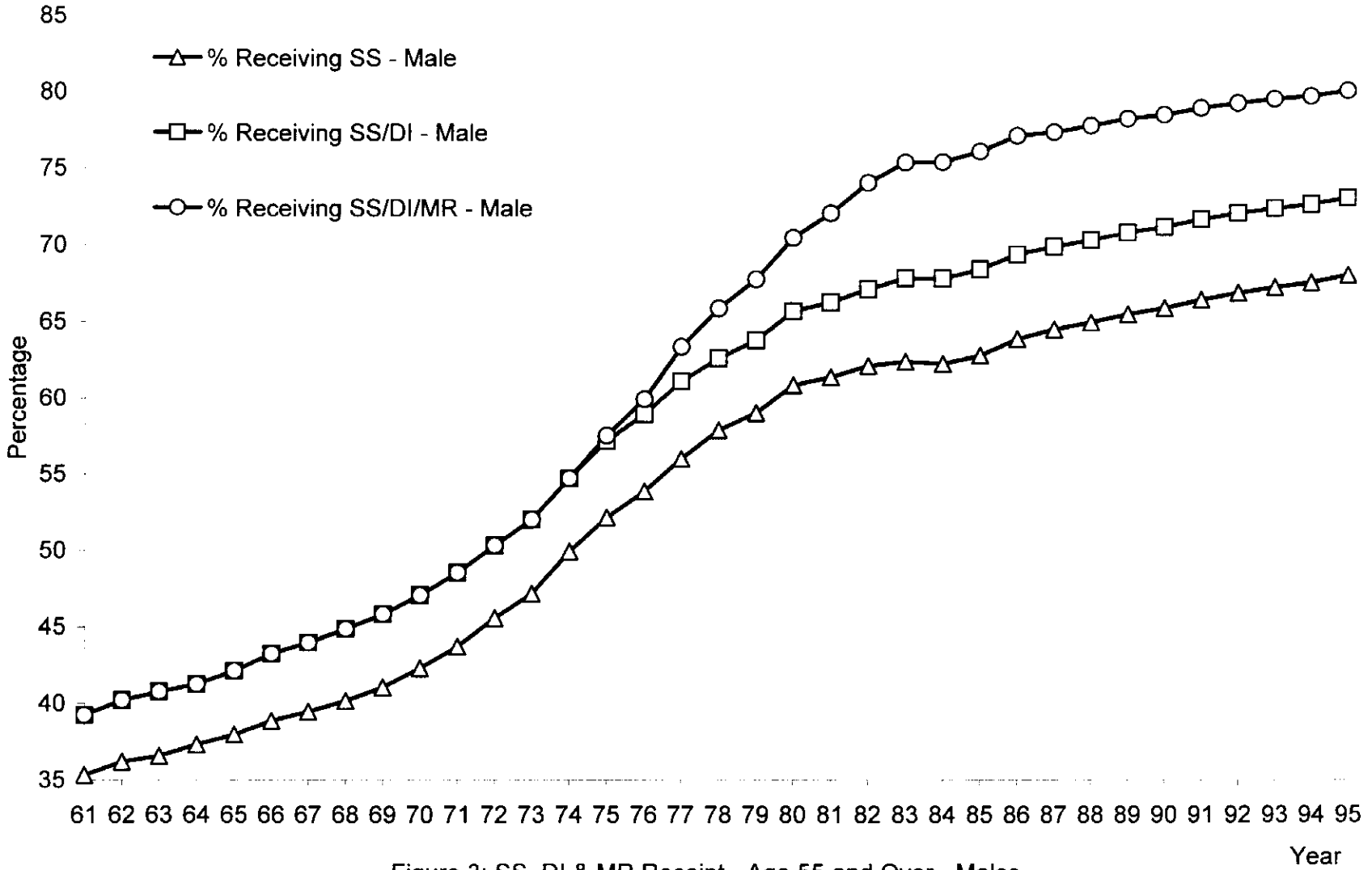

Figure 3: SS, DI & MR Receipt - Age 55 and Over - Males
Source: Bouillot and Perelman (1994), own computations

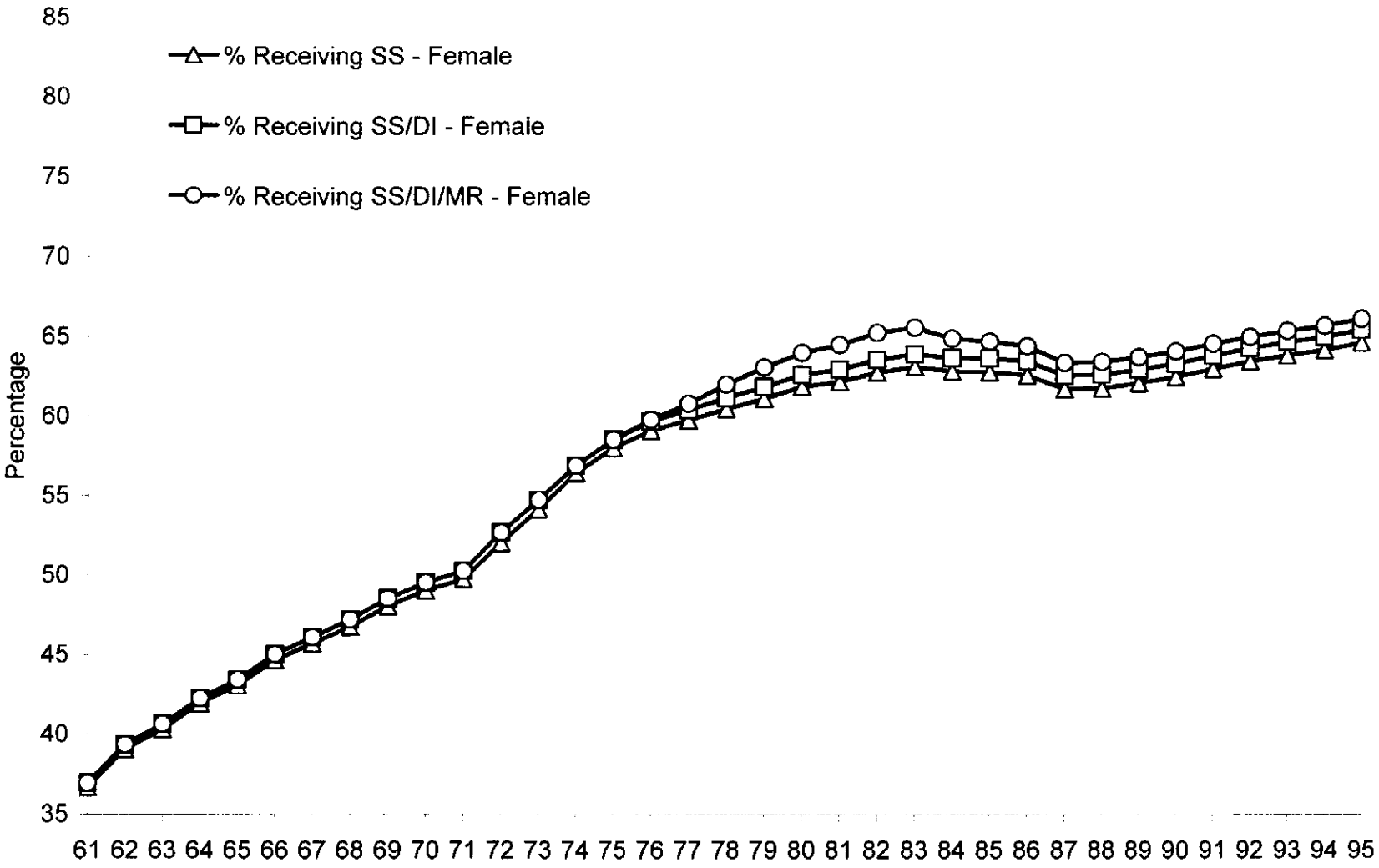

Figure 4: SS, DI & MR Receipt - Age 55 and Over - Females
Source: Bouillot and Perelman (1994), own computations

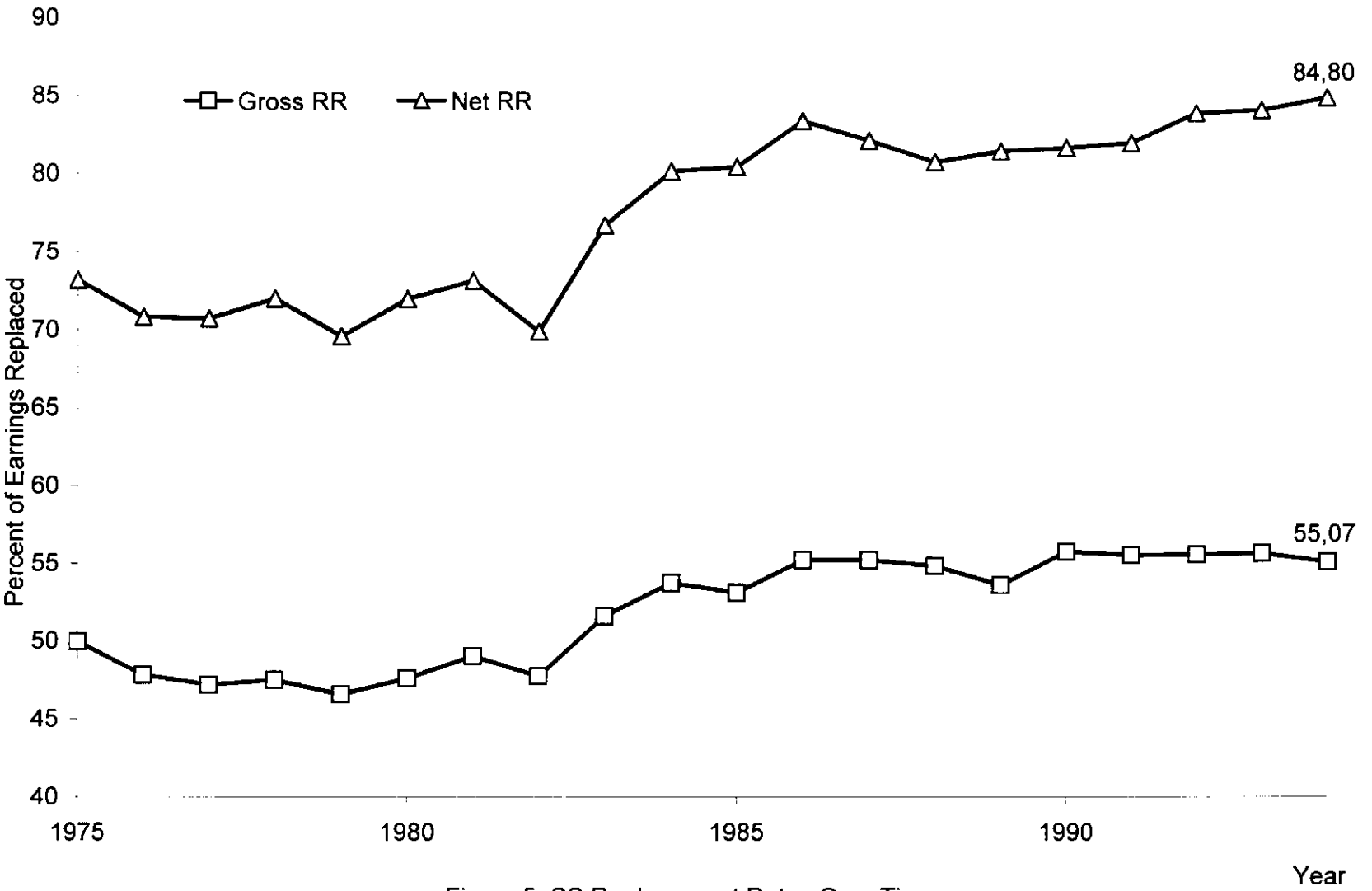

Figure 5: SS Replacement Rates Over Time
Source: own computations

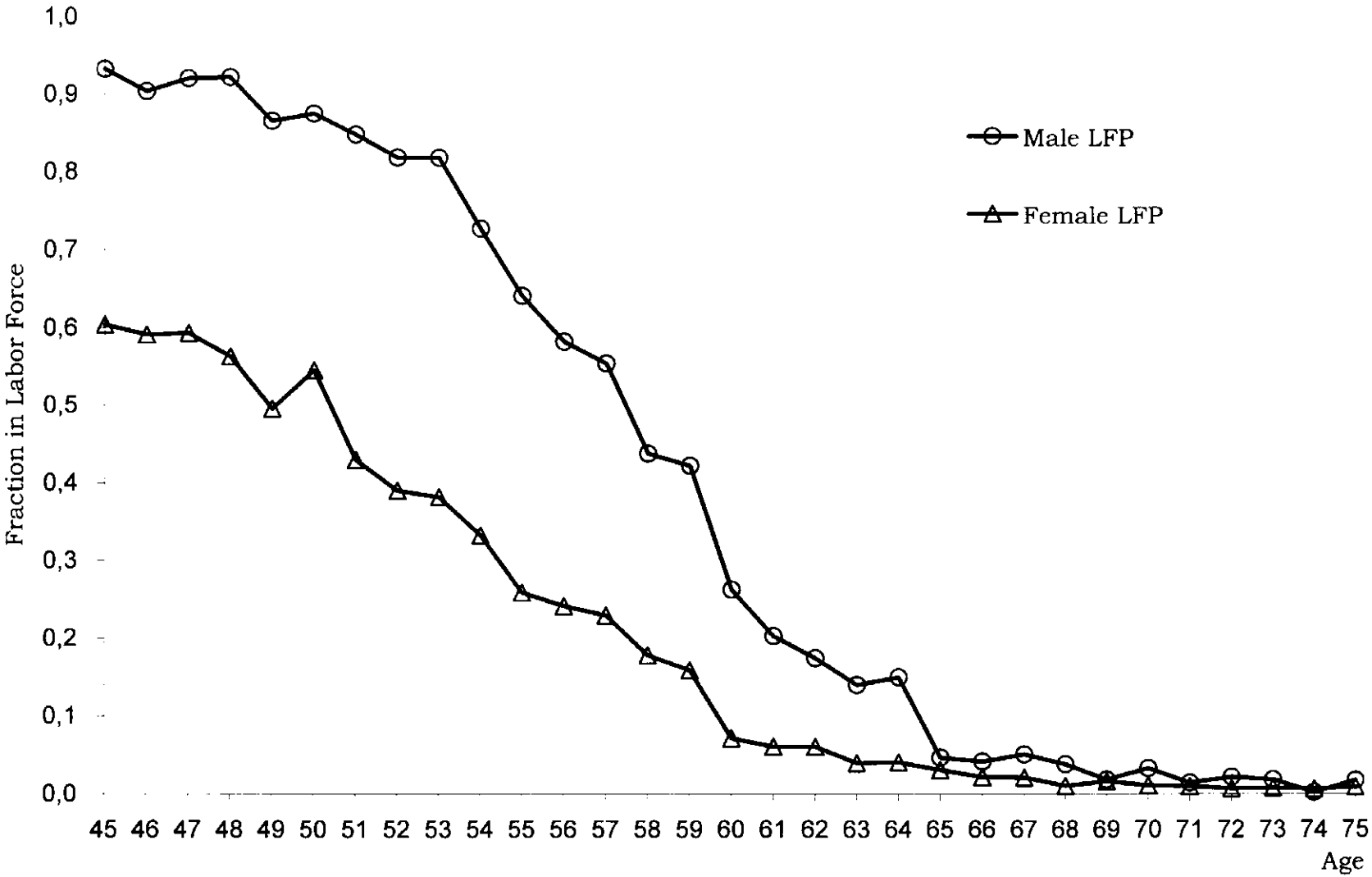

Figure 6: Participation Rates by Age and Sex
Source: I.N.S., Labor Force Survey, 1995

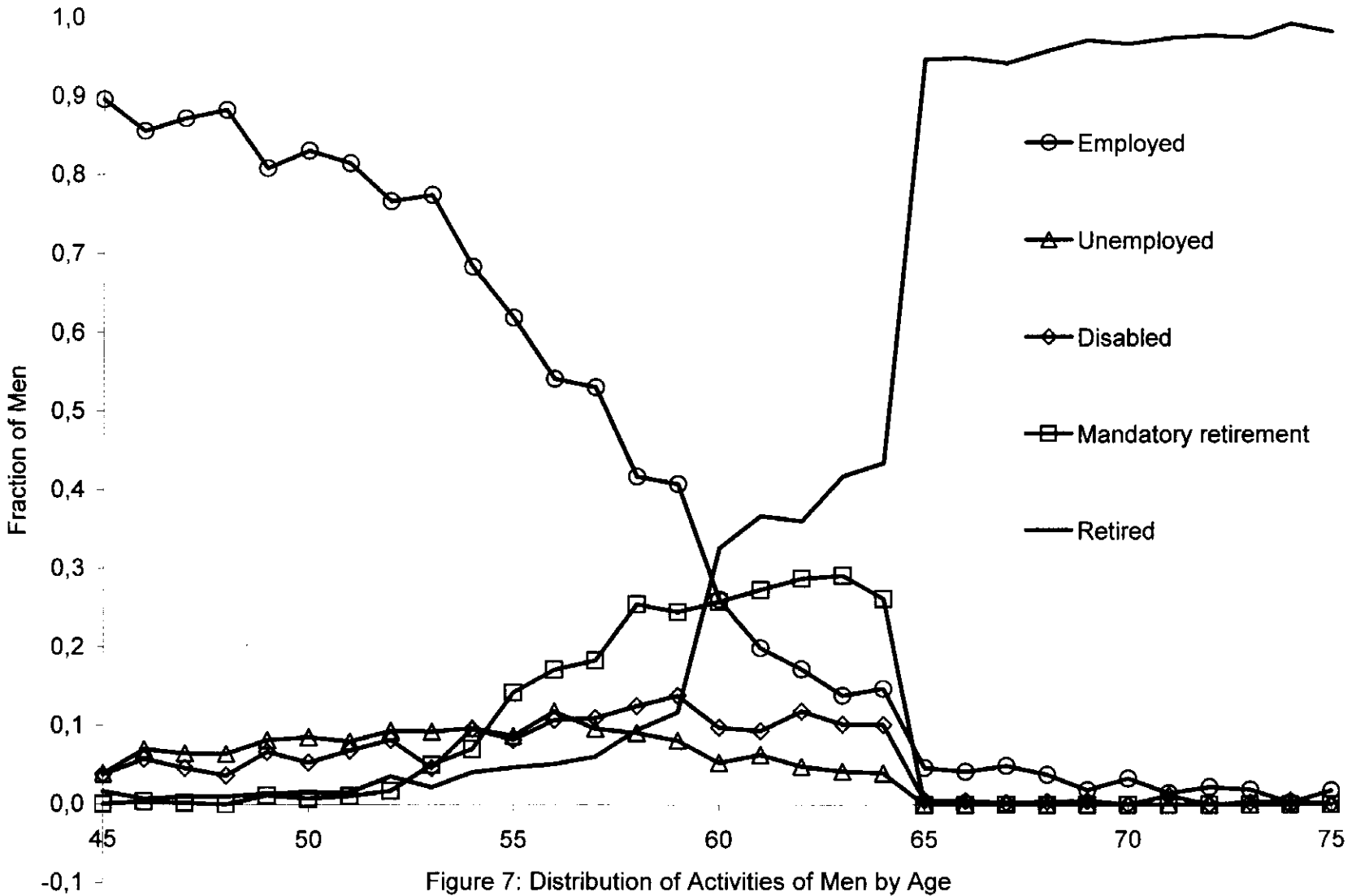

Figure 7: Distribution of Activities of Men by Age
Source: I.N.S, Labor Force Survey, 1995

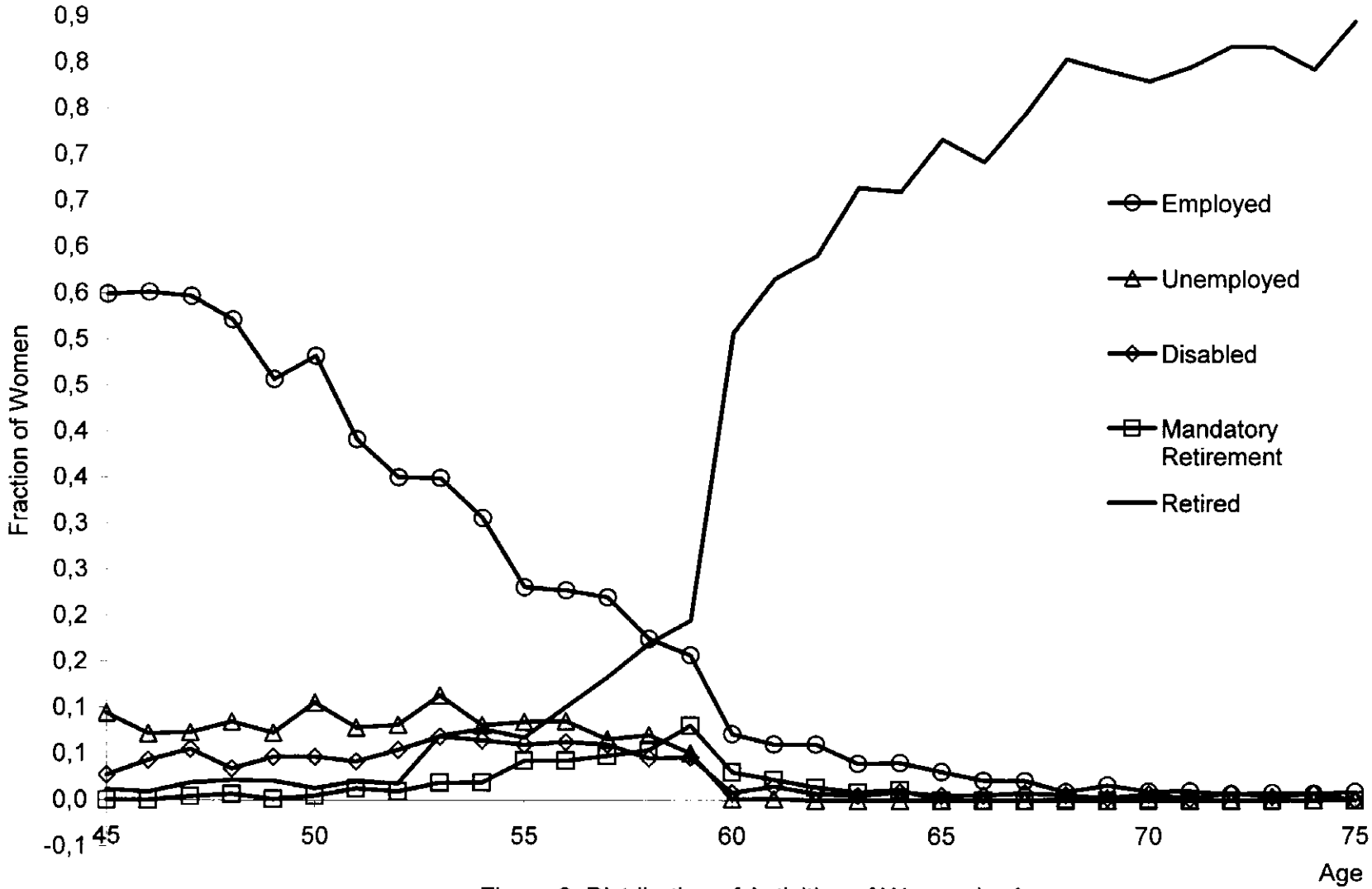

Figure 8: Distribution of Activities of Women by Age
Source: I.N.S, Labor Force Survey, 1995

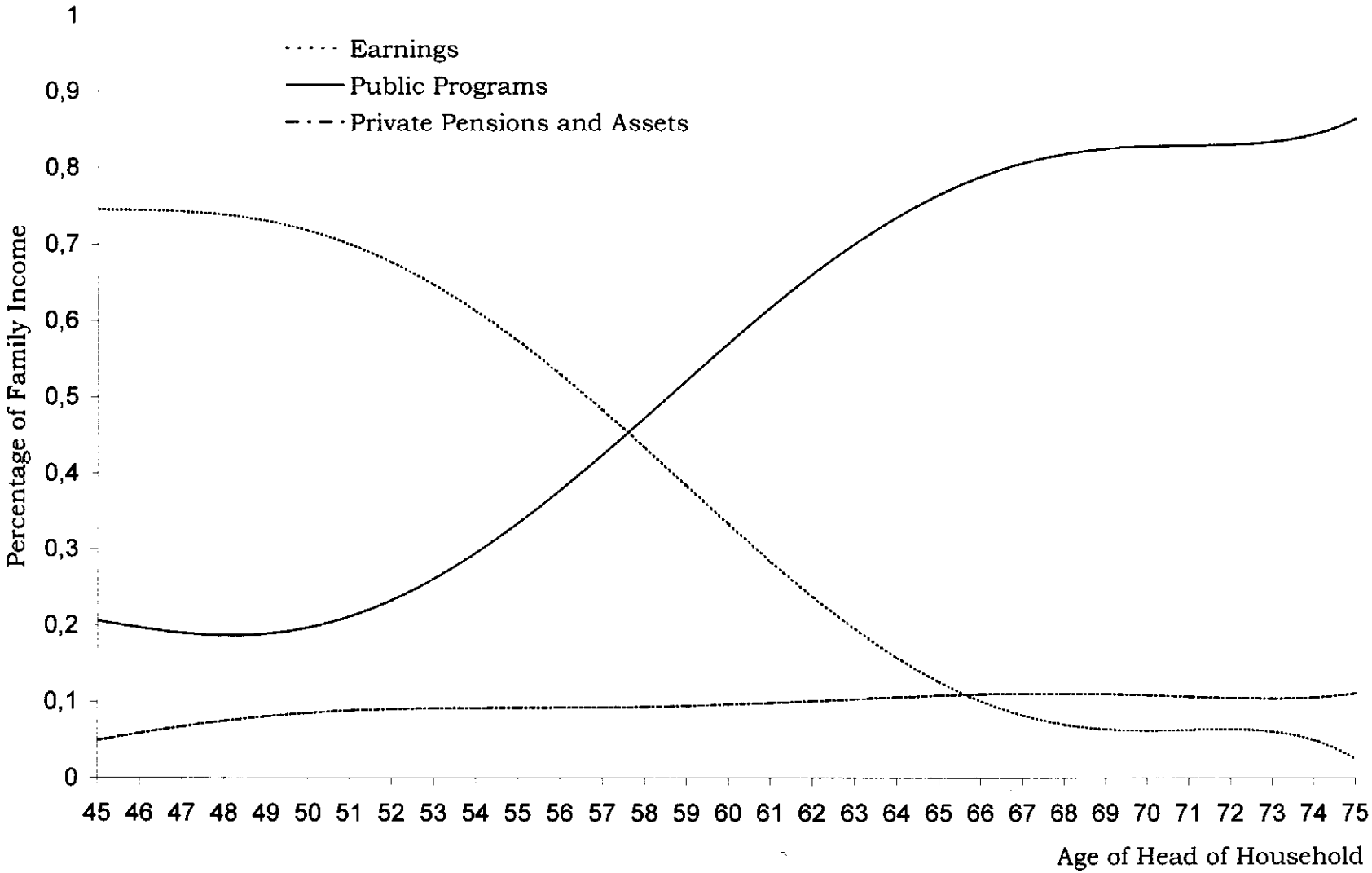

Figure 9: Breakdown of Source of Family Income
Source: own computations, CSB 1992

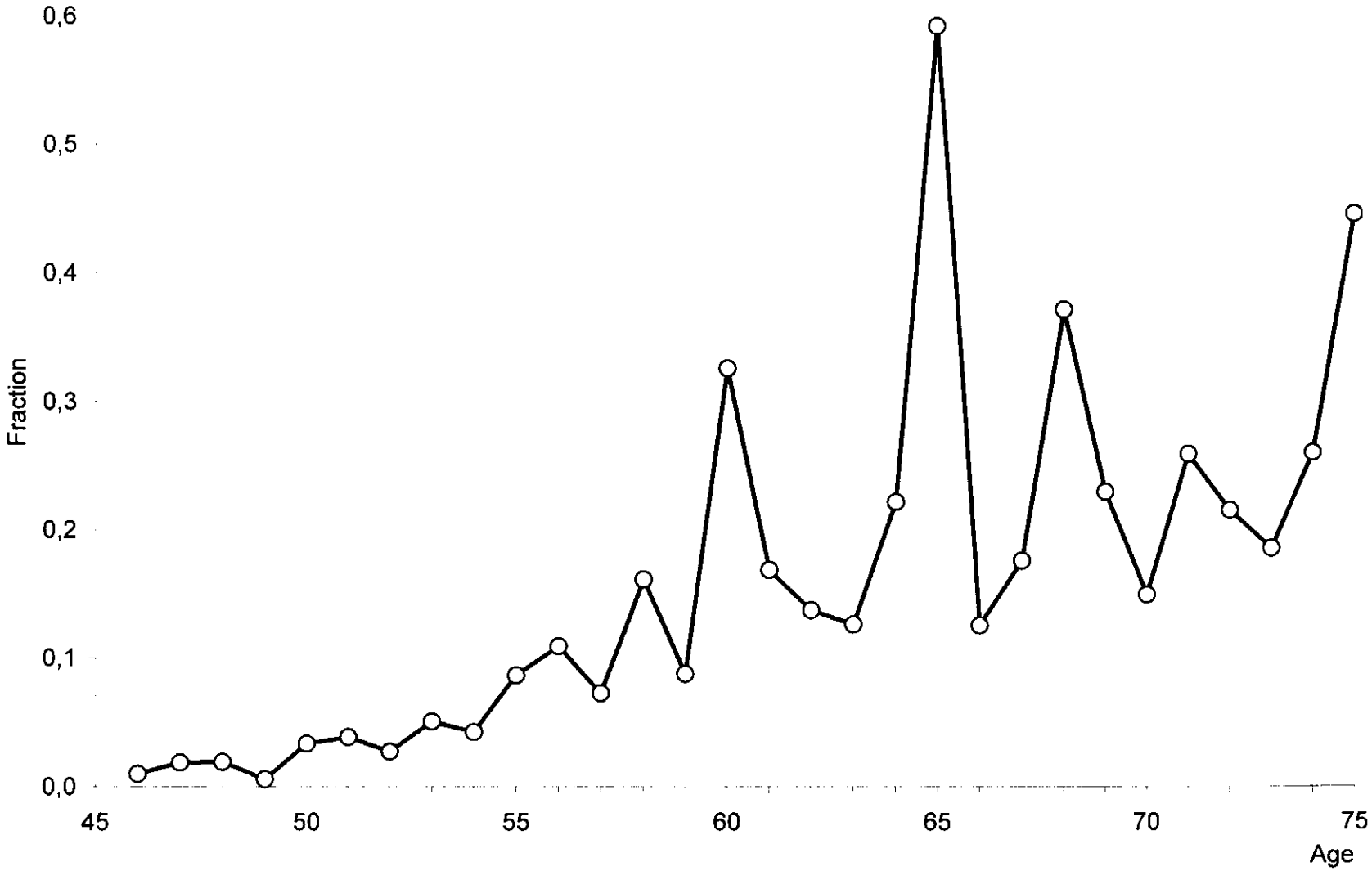

Figure 10: Hazard Rate Out Of LF for Men
Source: I.N.S., Labor Force Survey

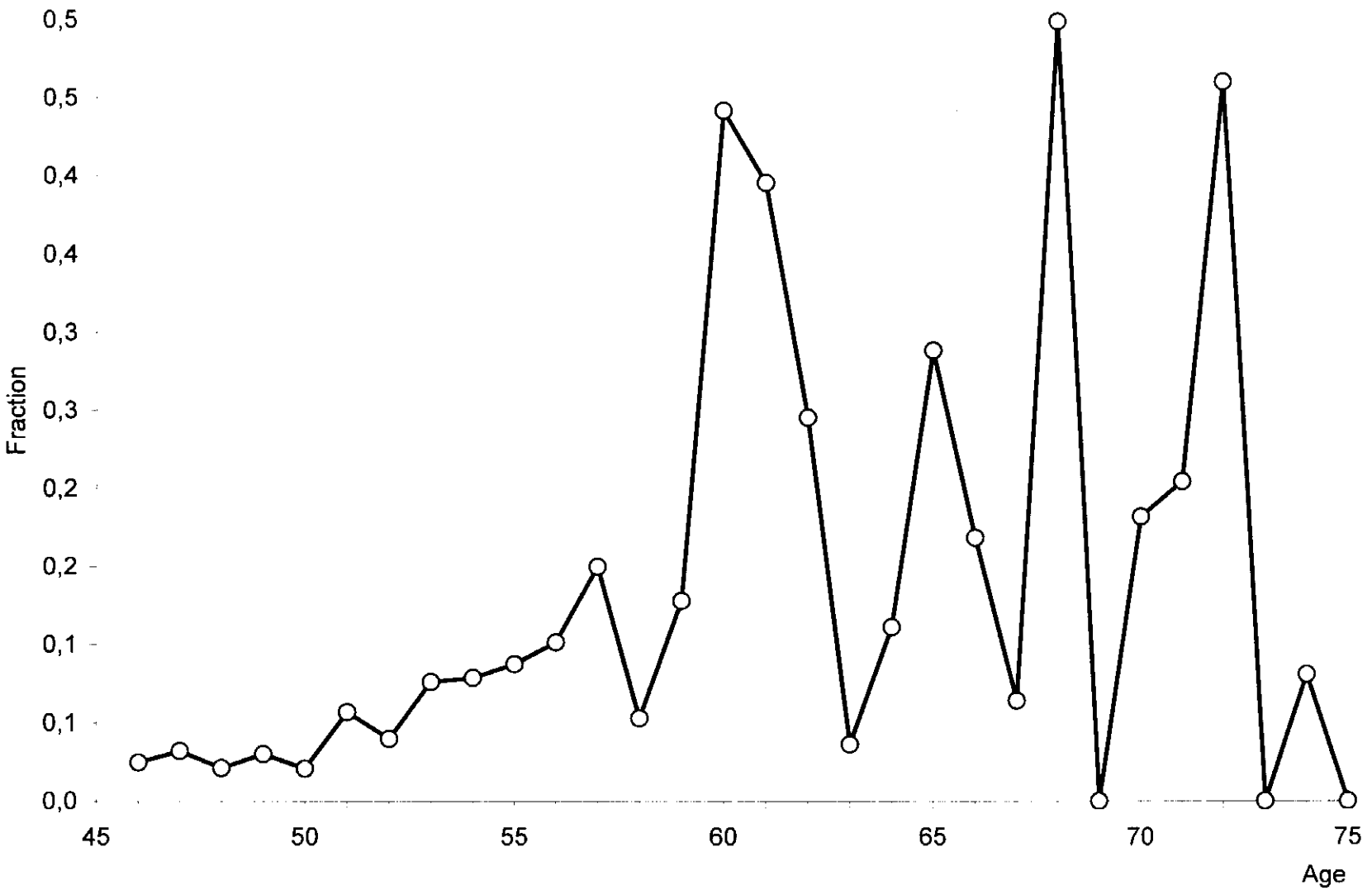

Figure 11: Hazard Rate Out Of LF for Women
Source: I.N.S., Labor Force Survey

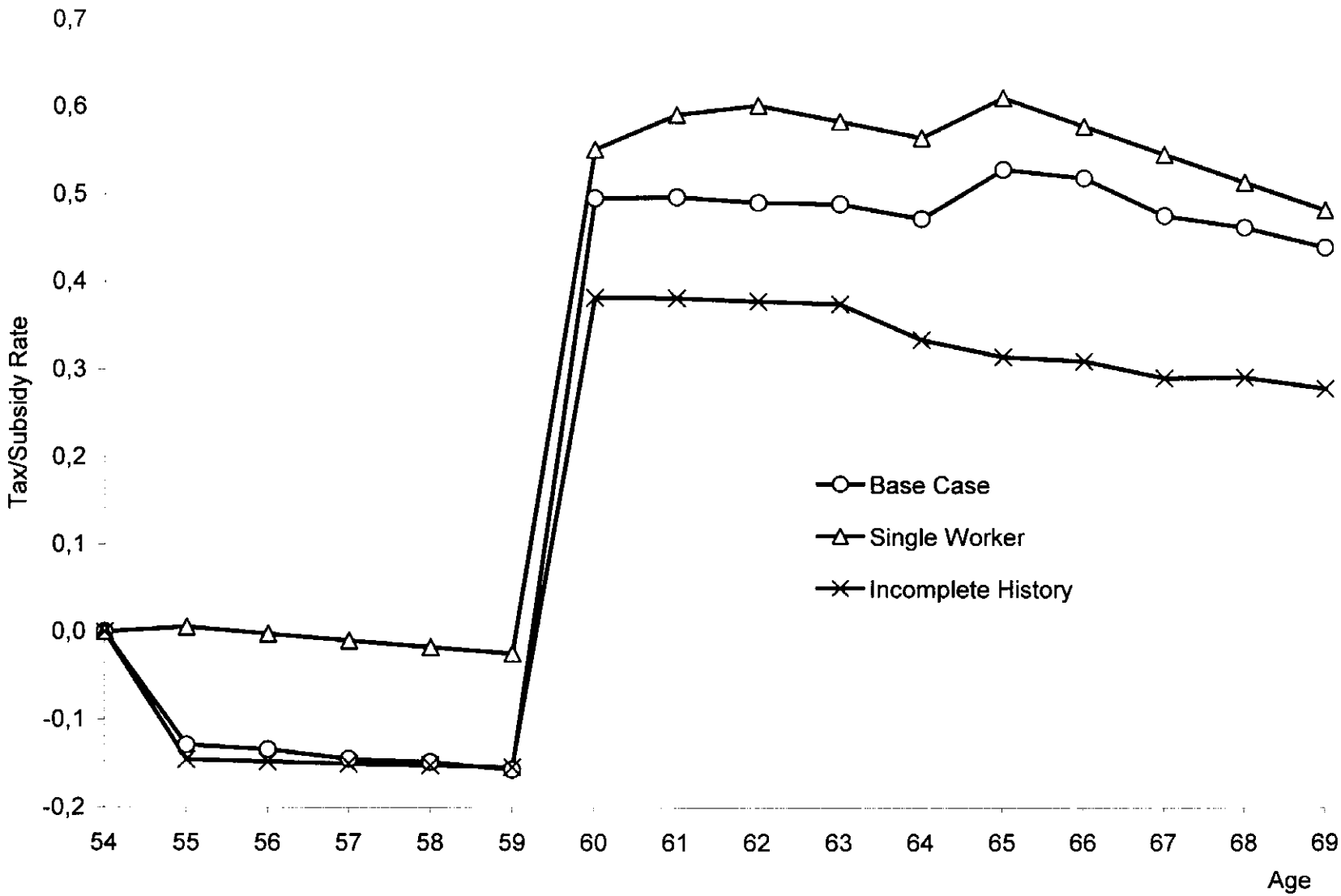

Figure 12: Tax/Subsidy Rates Across Career Profiles and Marital Status

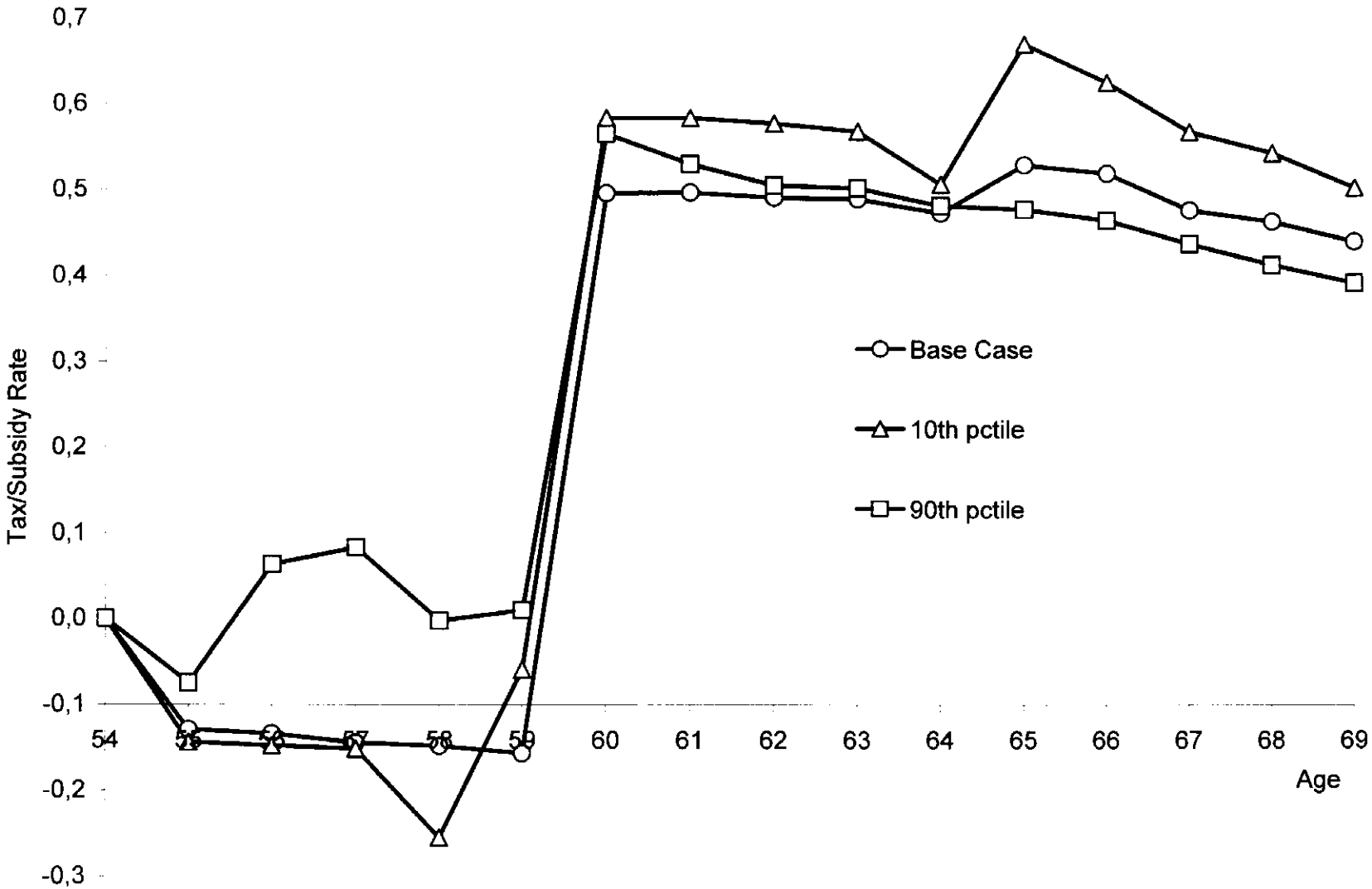

Figure 13: Tax/Subsidy Rates Across Earnings Profiles

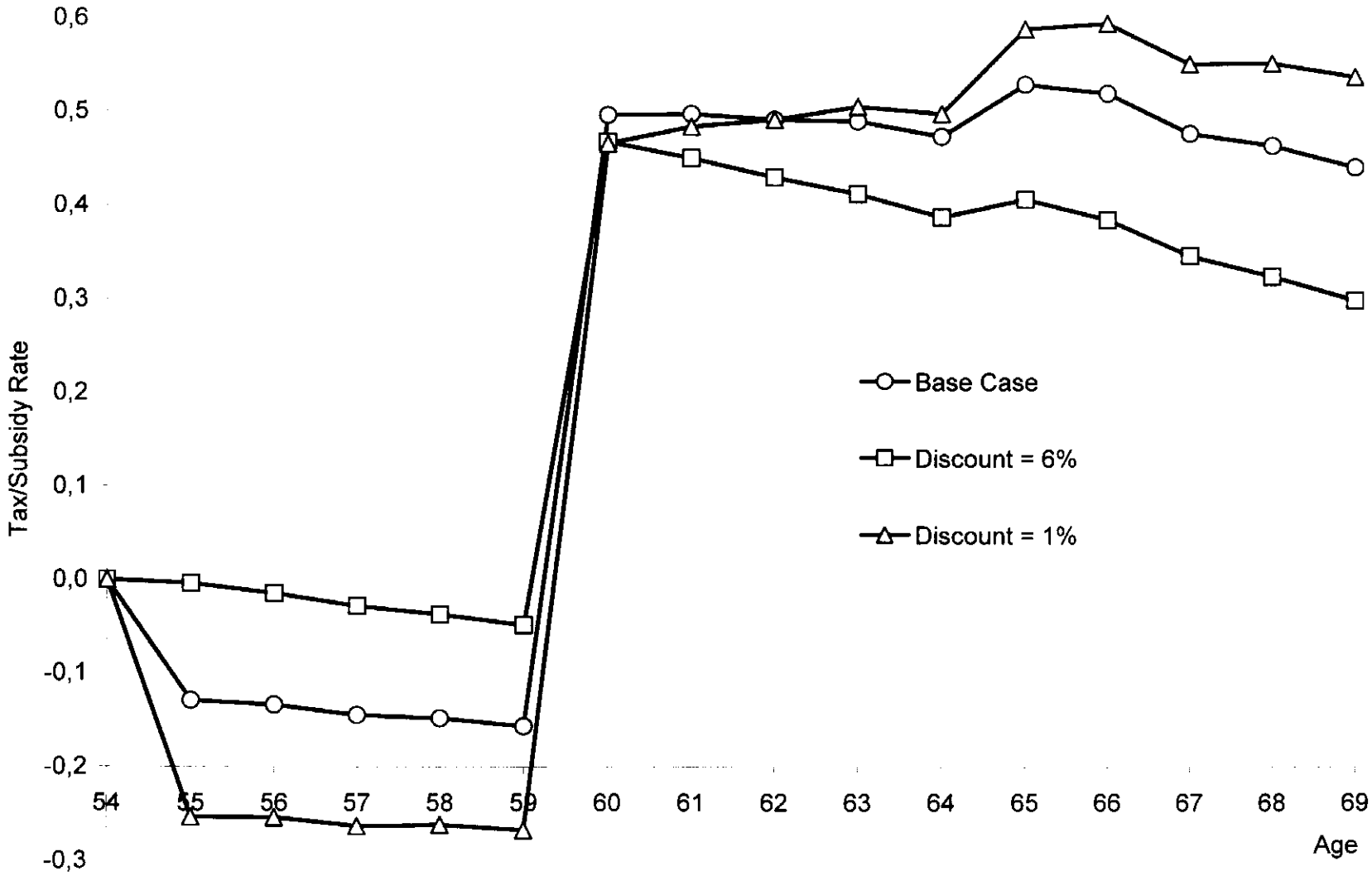

Figure 14: Tax/Subsidy Rates Across Discount Rates

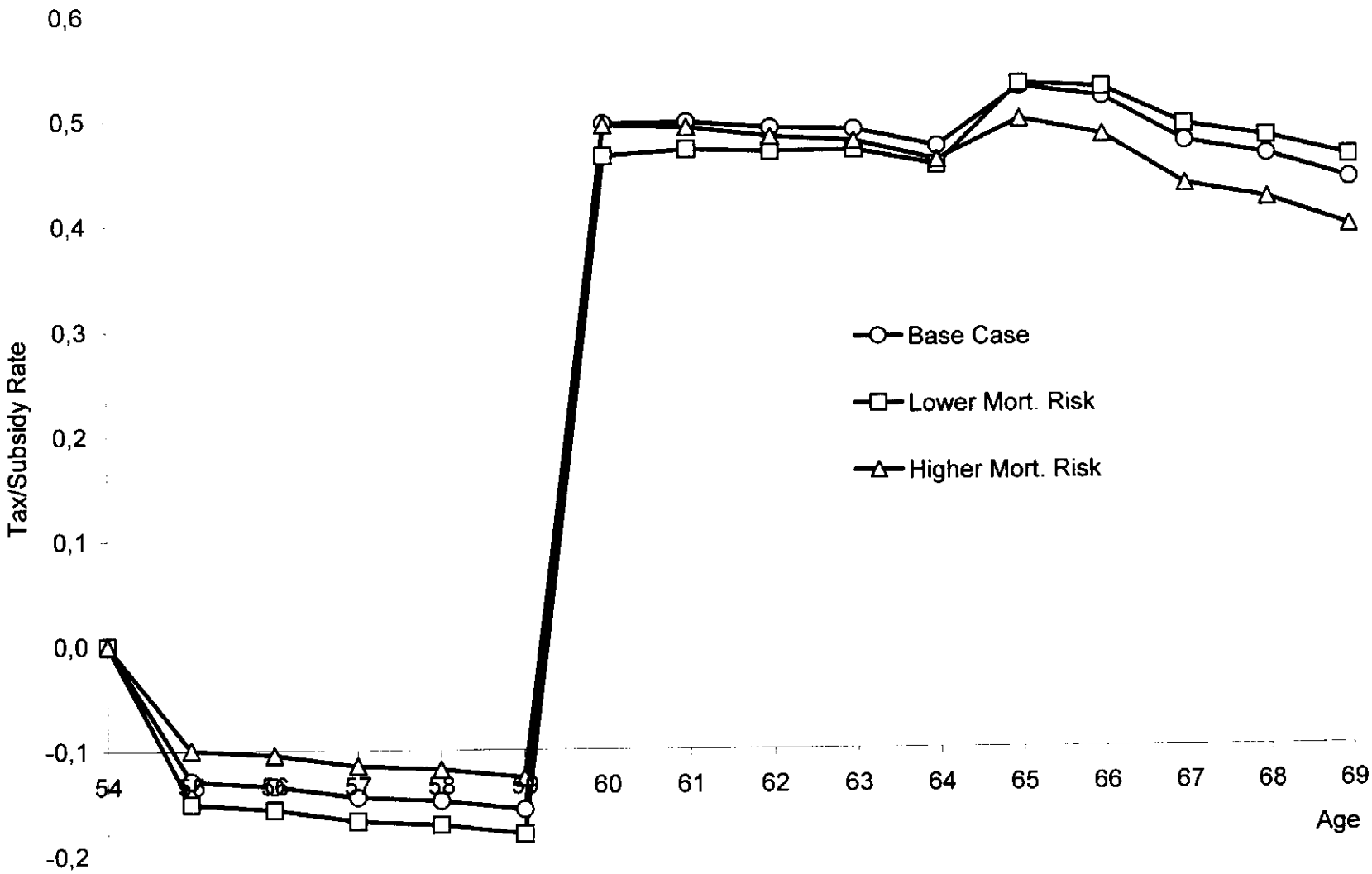

Figure 15: Tax/Subsidy Rates Across Mortality Risk

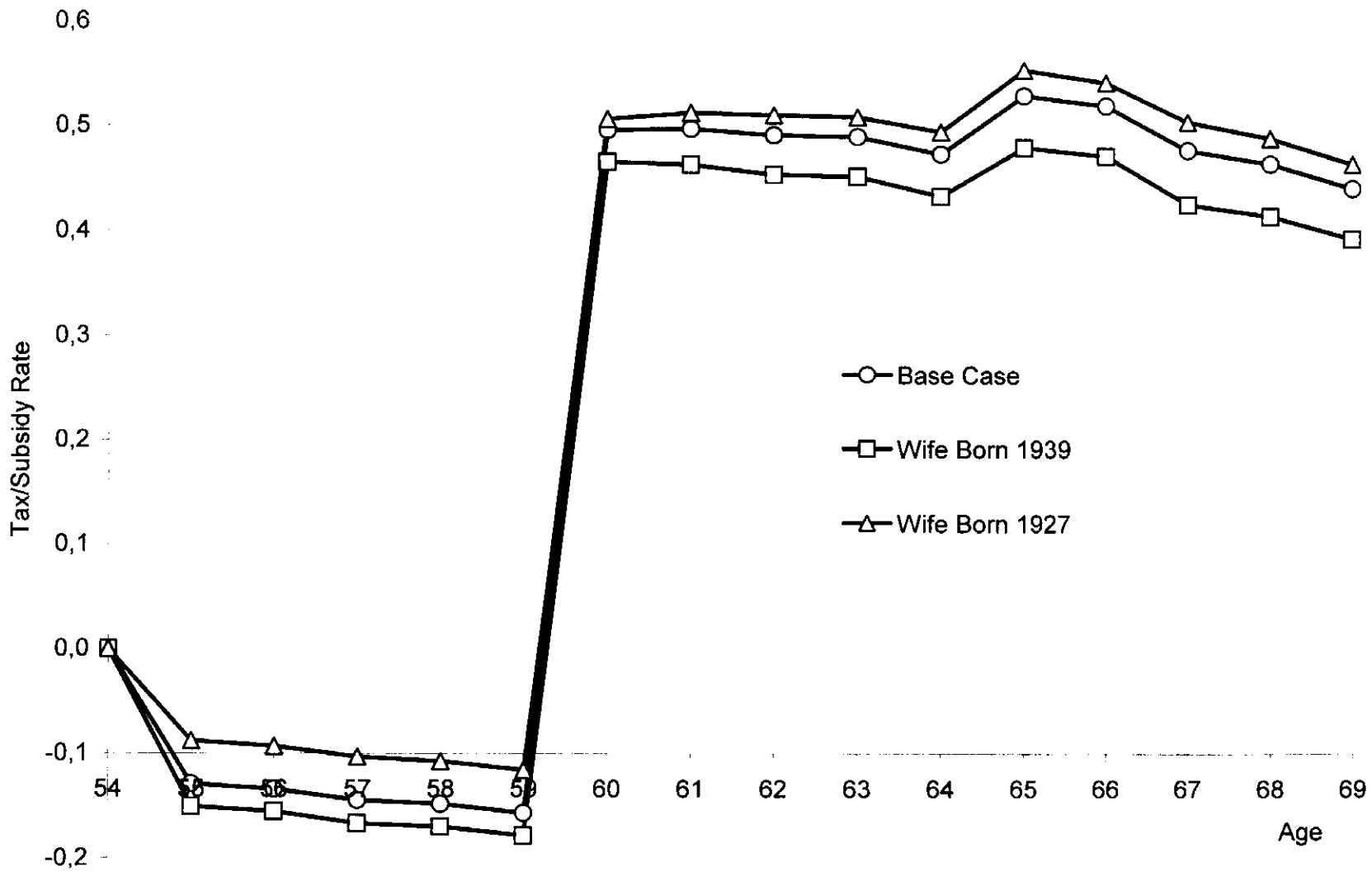

Figure 16: Tax/Subsidy Rates Across Wife's Age

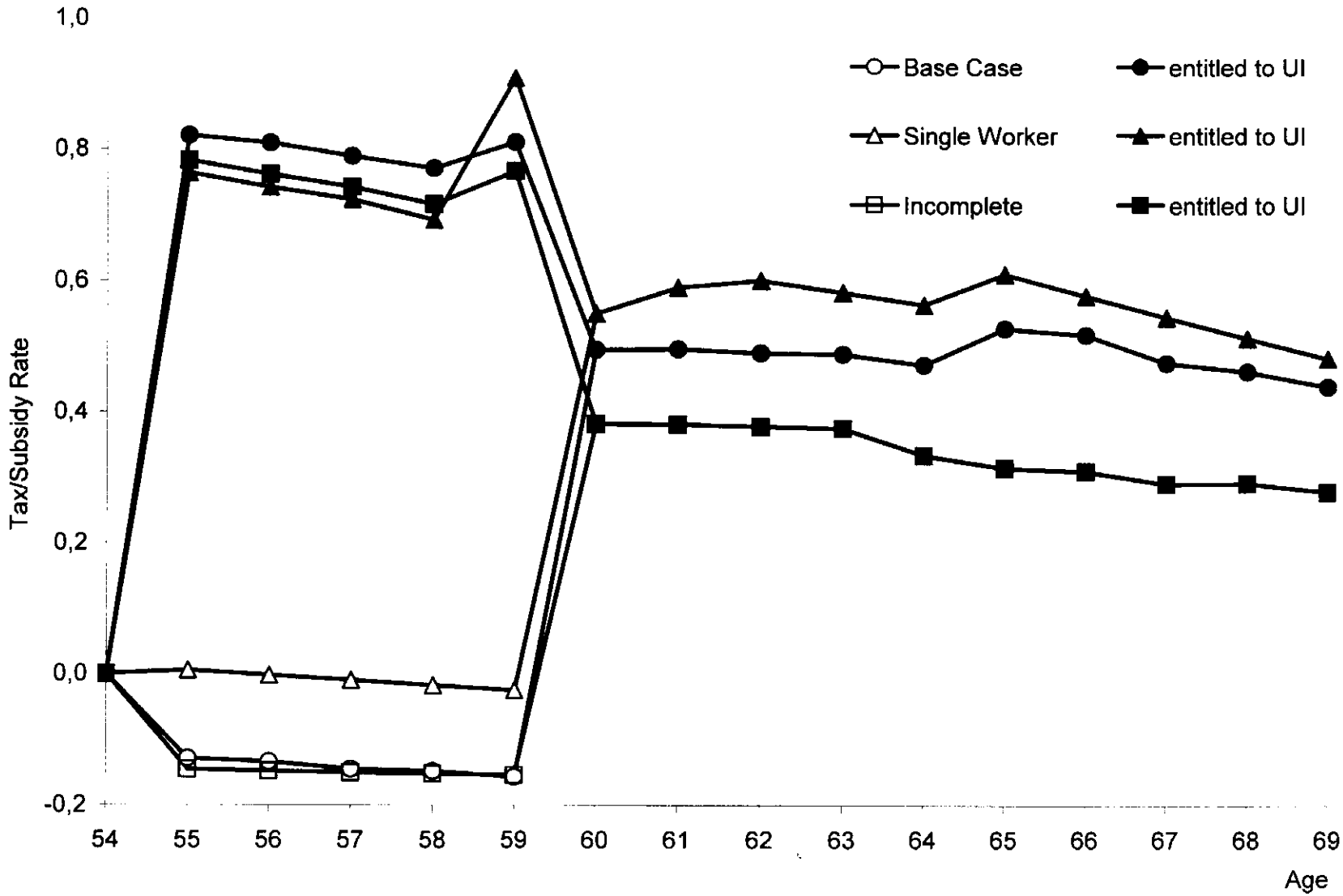

Figure 17: Tax/Subsidy Rates with and without entitlement to UI

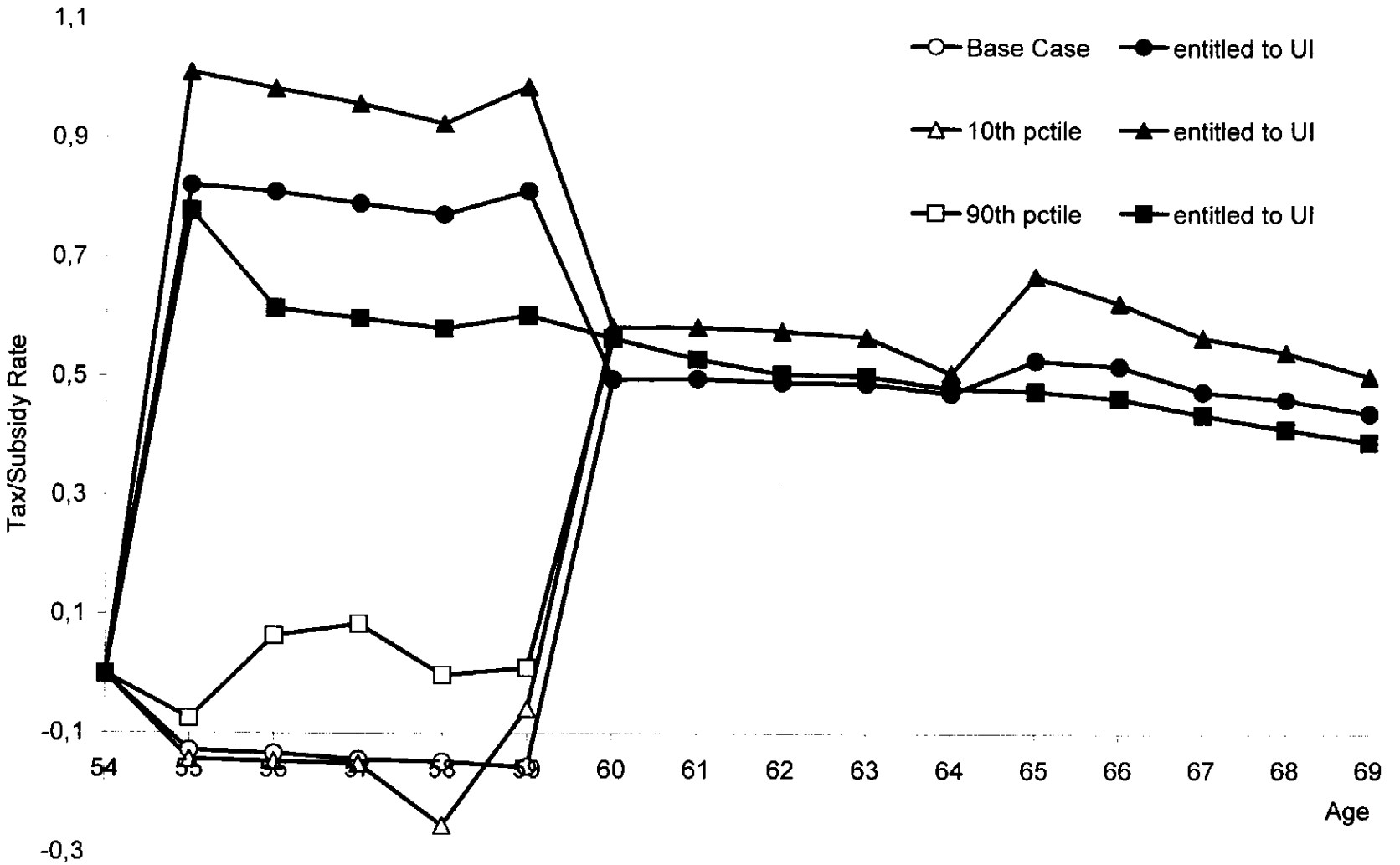

Figure 18: Tax/Subsidy Rates with and without entitlement to UI (cont.)

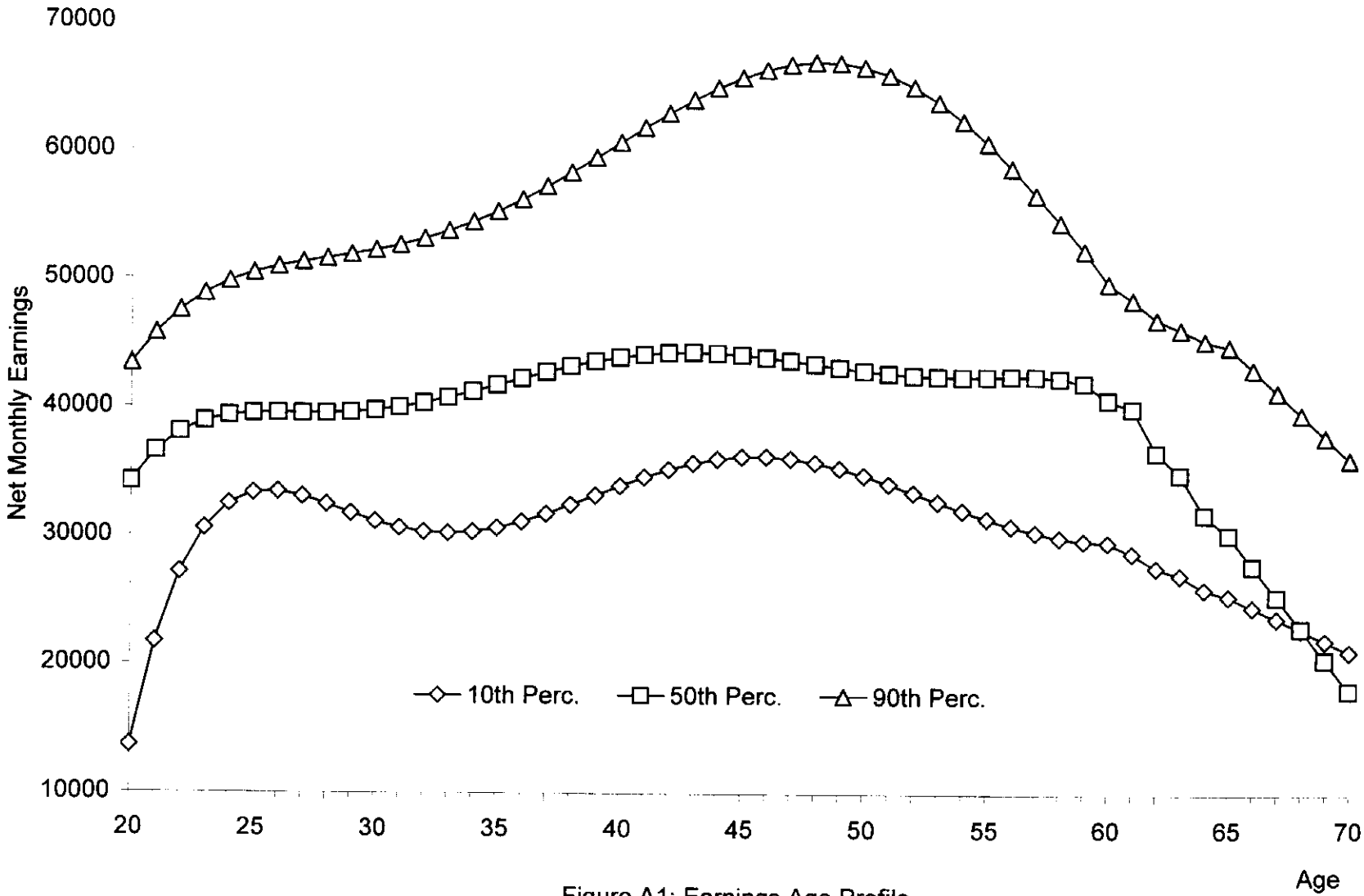

Figure A1: Earnings Age Profile
Source: own computations, CSB 1992