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LIFETIME INCOMES IN FINLAND -
DESK CALCULATIONS BASED ON
CIVIL SERVANT SALARIES 1985

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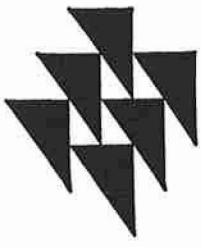


1. PRELUDE

Any discussion of the income distribution among persons is crucially dependent on three definitional issues, i.e.

(a) the definition of the 'income' concept itself, or which types of compensation/remuneration in cash and/or in kind should be regarded as 'income' ?

(b) the selection of a appropriate income recipient unit, and

(c) the time period over which incomes are recorded.

Even if these issues are closely interrelated (cf. Nygard and Sandstrom [1981]), this paper seeks to illustrate the importance of point (c) above, or how the income distribution responds to changes in the time horizon.

In this context it should, as a first preliminary remark, be noted that the mainstream approach to both measurement theoretical and empirical studies of income distributions tends to consider annual income as an appropriate income magnitude. Although this approach may seem reasonable to the practitioner - incomes are usually recorded on an annual basis due to taxation practice - it is open to objections from a more fundamental point of view, taking life-cycle considerations into account and separating between transitory and permanent incomes.

Life-cycle aspects have been stressed by e.g. Paglin [1975], Lillard and Willis [1978], Weizsacker [1978], and Rosen [1984], and it is easily realized that, due to intertemporal variations in the income flow, the distribution of current

incomes may differ substantially from the distribution of lifetime incomes.

Similarly, measures of income inequality operating on an annual basis may give misleading indications of the 'true' inequality, paricularly in cases when the major source of interpersonal income variation is highly transitory. In fact, for a large group of income inequality measures it may be established (cf. Shorrocks [1978]) that the income inequality calculated on a 'lifetime' basis can never exceed a weighted average of the constituent 'annual' measures of inequality.

To place life-cycle aspects and the notion of income mobility on an empirical footing involves some difficulties. In broad outline, we may rely on one of the following three approaches:

First, when genuine panel data on incomes is available, empirical estimates of lifetime incomes and/or income mobility patterns (quite similar to Markov transition matrices) may be calculated. Yet, the resulting figures relate to past history, and their significance and implications in the current situation may be elusive.

Second, it may be possible to derive life-cycle patterns from a set of cross-section data using some 'correction' technique, e.g. concentration curve and/or regression methods. This approach suffers from the evident drawback that the true underlying life-cycle patterns may be confounded by ill-conditioned 'corrections', a possibility hard to guard against in practice.

Third, the implications of income mobility may be illustrated by looking at 'representative' income recipients and their lifetime income career. In the present paper, this approach will be applied to Finnish data.

Even if the adopted framework will be rather rigid and over-simplified, it may still serve to illustrate the different implications of the 'annual' and the 'lifetime' approach to income differences.

As noted above, the discussion in this paper will be based on the idea of 'representative' income recipients.
To spell out the framework in somewhat greater detail, we will treat lifetime incomes from the perspective of a young man (Homo Economicus), 18 years old, who after completing secondary school considers whether he should (a) join the labor force, or (b) invest in further training for some years to qualify for a job with higher salary.
For ease of exposition we further suppose that the young mans decision set is restricted to appointments as a Finnish civil servant - a brief review of the present salary agreements is given in Appendix A1 - and that only three alternative income careers are at issue: The first career requires no further training and pays at salary grade A5 (corresponding to an appointment as e.g. messager or caretaker). Qualifying for the second appointment, paying at grade A15 (as e.g. assistant accountant) requires three more years of education, while the third job, paying at grade A20 (as e.g. accountant or jurist), would require seven additional years of schooling.
Moreover, our young man treats his choice as definitive, so that once he has reached a career choice he will hold this appointment util retirement at age 63, anticipating to die shortly before his 72nd birthday. Taking the situation 1985 as the point of departure, with effective salary agreements and tax amounts as given in Appendix A, we may now try to calculate the lifetime payoffs of the optional career choices. This will be done in the following section.

3. LIFETIME INCOMES

3.1 INCOME CAREERS

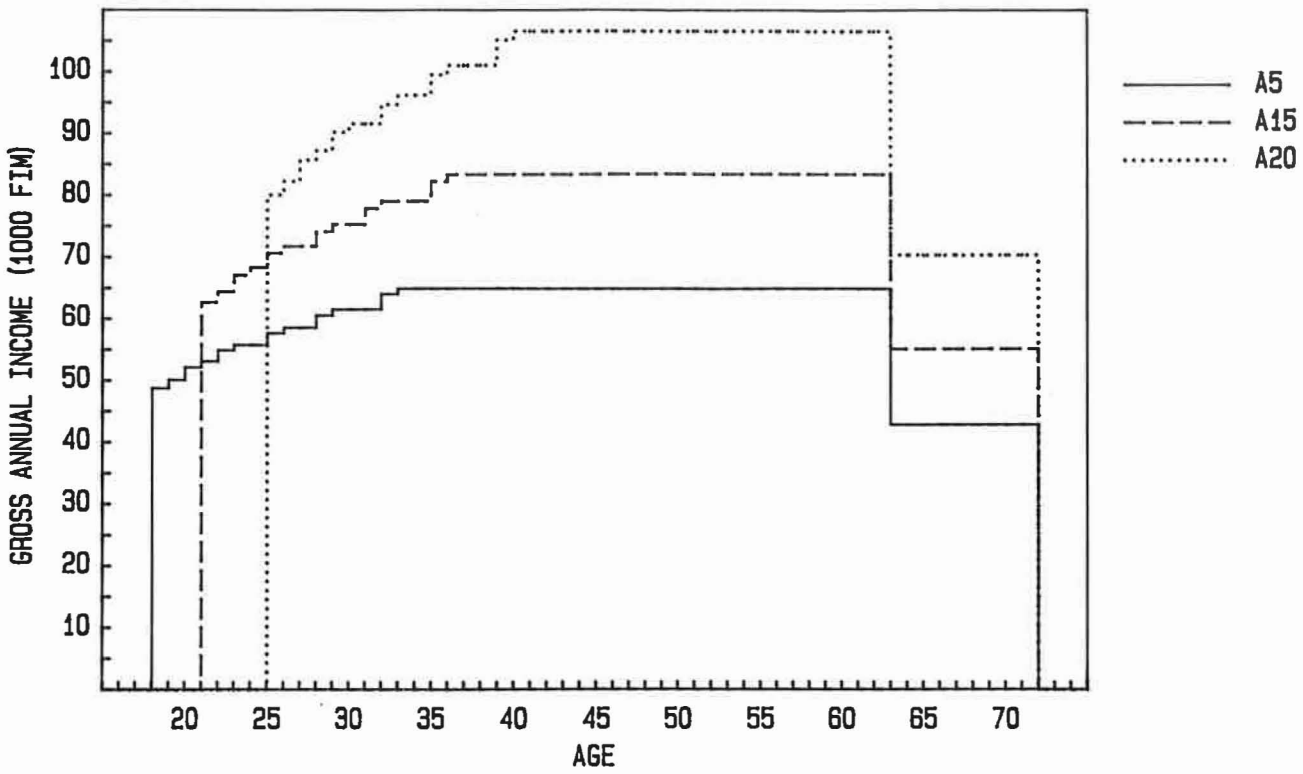
Obviously, the calculations of lifetime incomes must rest on assumptions about the future salary level paid at different grades and other possible changes in the salary agreements. Further, if we wish to distinguish between gross and net income, this requires knowledge of future taxation schemes.

For simplicity we suppose that the young man anticipates the 1985 conditions to be effective during his lifetime, implying that he assumes away inflation and ignores all future changes in salary agreements and taxation schemes. From a real income point of view, this amounts to the same thing as imposing full inflationary corrections to salary levels and taxation schemes.

Under these conditions, the A5 career pays a commencing annual gross salary of 48 730 FIM (net 35 990 FIM), the A15 salary at age 21 amounts to 62 690 FIM (43 380 FIM), while the A20 career starts off at age 25 with a salary of 80 070 FIM (52 380 FIM). The corresponding final salaries prior to retirement at age 63 are 64 830 FIM (44 480 FIM), 83 400 FIM (54 000 FIM), and 106 510 FIM (64 850 FIM), respectively. A full outline of the yearly gross and net incomes applying to the three income careers at different ages is given in Figure 3.1. The consequences of tax progressivity should be noted: The differences in annual income between the careers are reduced by roughly one half when passing from gross to net income.

Figure 3.2, in turn, presents the result of cumulating annual

Figure 3.1 Gross and net annual income according to age: Salary grades A5, A15, and A20.



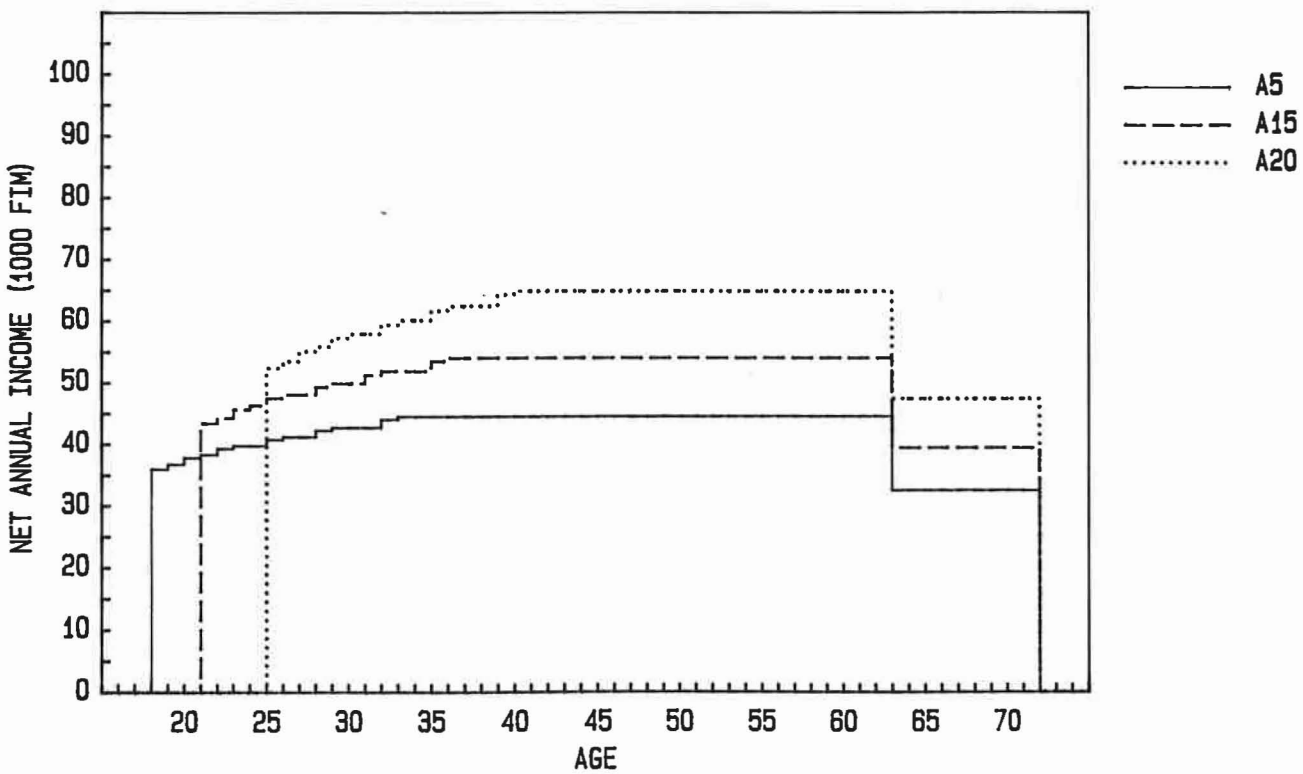
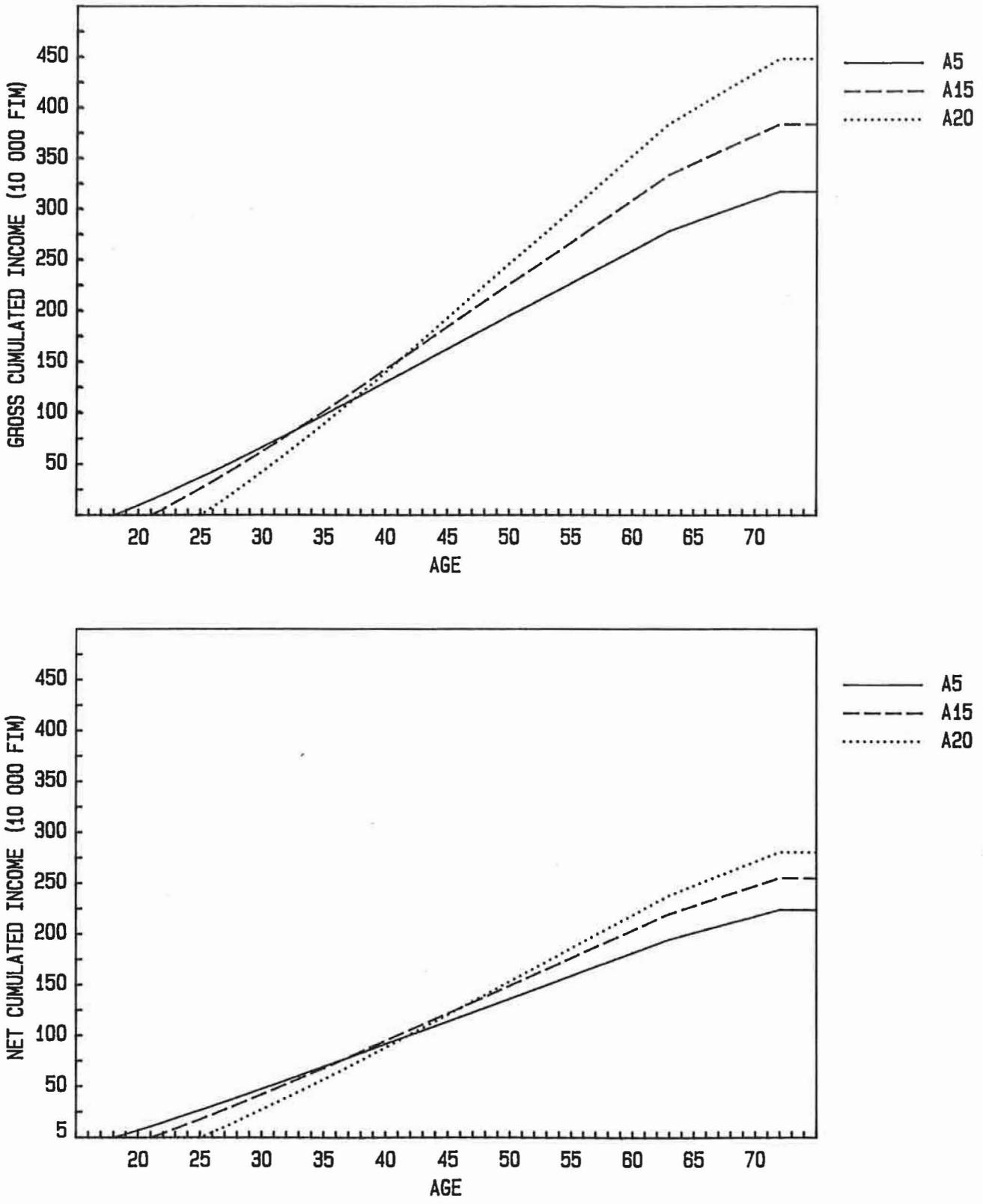


Figure 3.2 Cumulated gross and net incomes: Salary grades A5, A15, and A20.



incomes over the lifetime. The civil servant becomes a gross income millionaire at the age of 34-36 (depending on his salary grade), and a net income millionaire when he is 40-41 years old. The accumulated net income profiles intersect at age 36 (when the A15 servant catches up with the A5), at 41 years (the A20 career cathing up with the A5), and at age 46 (the A20 servant having for the first time accumulated net earnings in excess of the A15).

According to the A5 pattern the gross lifetime income amounts to 3.18 millions, the A15 lifetime income to 3.85 millions, and the A20 career results in a gross income of 4.49 millions. The corresponding net payoffs are 2.23, 2.54, and 2.80 millions, respectively. According to this result, a rational young man should choose the A20 career, requiring seven more years of education, in order to maximize his lifetime income. Yet, the consequences of taxation should again be noted: the A20 gross lifetime income exceeds the A5 income by some 41 per cent, whereas the corresponding net incomes differ by only about 25 per cent.

Some supplementary taxation aspects are illustrated in Table 3.1, giving actual minimum, maximum, and average tax rates for the three careers. The minimum rate corresponds to the commencing annual salary of each career, the maximum rate to the final salary prior to retirement, and the average rate, in turn, is derived as the ratio of lifetime taxes to lifetime gross income.

As can be seen from the Table, preferring the A15 career to the A5, or the A20 to the A15, results in an increase by some 4 per cent of the actual tax rates.

Table 3.1 Actual and hypothetical tax rates for the careers A5, A15, and A20.

CAREER	TAX RATES (per cent) ACTUAL			HYPOTHETICAL	
	Min	Max	Lifetime	Option 1	Option 2
A5	26.1	31.4	29.9	29.9	29.7
A15	30.8	35.3	33.9	33.7	32.9
A20	34.6	39.1	37.6	36.8	35.2

In addition, Table 3.1 includes lifetime tax rates corresponding to two hypothetical revisions of the Finnish taxation scheme.

Option 1 is related to a recent discussion in Finland about possible alleviations of the marginal tax rate for medium and high incomes. To be more precise, the lifetime tax rates under this option are derived by splitting the present state taxation scheme (cf Appendix A2) into two parts: for annual incomes below 47 000 FIM no changes of present taxation are assumed, whereas the taxation of higher incomes (exceeding 47 000 FIM) is revised by fixing the marginal state tax rate to 29 per cent. As can be seen from the Table, the effect of such a revision is quite moderate. To the A5 servant, who falls below the 'critical' annual taxation level 47 000 FIM, the revision would have no consequences at all, whereas the A20 servant would experience a modest decrease in his lifetime tax rate from 37.6 to 36.8 per cent (corresponding to a net income increase by some 34 000 FIM).

Option 2, in turn, illustrates the fact that annual tax progressivity may be accentuated during the lifetime as the higher paid careers are associated with none-income years during education. The calcualations under this option are

derived by shifting the tax base from annual to lifetime incomes, using the accumulated income during the active ages 18-71 as an appropriate lifetime tax base, and adopting a corresponding 54-fold adjustment of the 1985 taxation scheme for lifetime tax calculations.
As can be seen from the Table, shifts of the tax base from annual towards lifetime incomes (option 2) may well have more marked consequences than simple revisions of the annual tax rates (option 1).

3.2 DISCOUNTED LIFETIME INCOMES

In the calculations of lifetime incomes in Section 3.1 the separate annual incomes are all treated as equally important, implying that the choice of career does not depend on how a given income is distributed over the life span. Several objections may be raised against this procedure, stressing the fact that it is preferable to obtain income now, rather than to wait for the same income amount for some years.
A frequently used method to take this type of considerations into account is by discounting the annual earnings to their present value, or in our case to their value at age 18.

In Figure 3.3 and Figure 3.4 the gross and net annual salaries, discounted at 2 and 4 per cent, respectively, are outlined.
To the young man the discounted annual incomes represent the amount of prospective salaries that he would be in control of at age 18, if he could find a creditor willing to borrow money at a real interest rate of 2 or 4 per cent with the servant's future earnings as security.
In Figures 3.5 and 3.6 the corresponding cumulated discounted

Figure 3.3 Gross and net annual incomes, discounted at 2 per cent: Salary grades A5, A15, and A20.

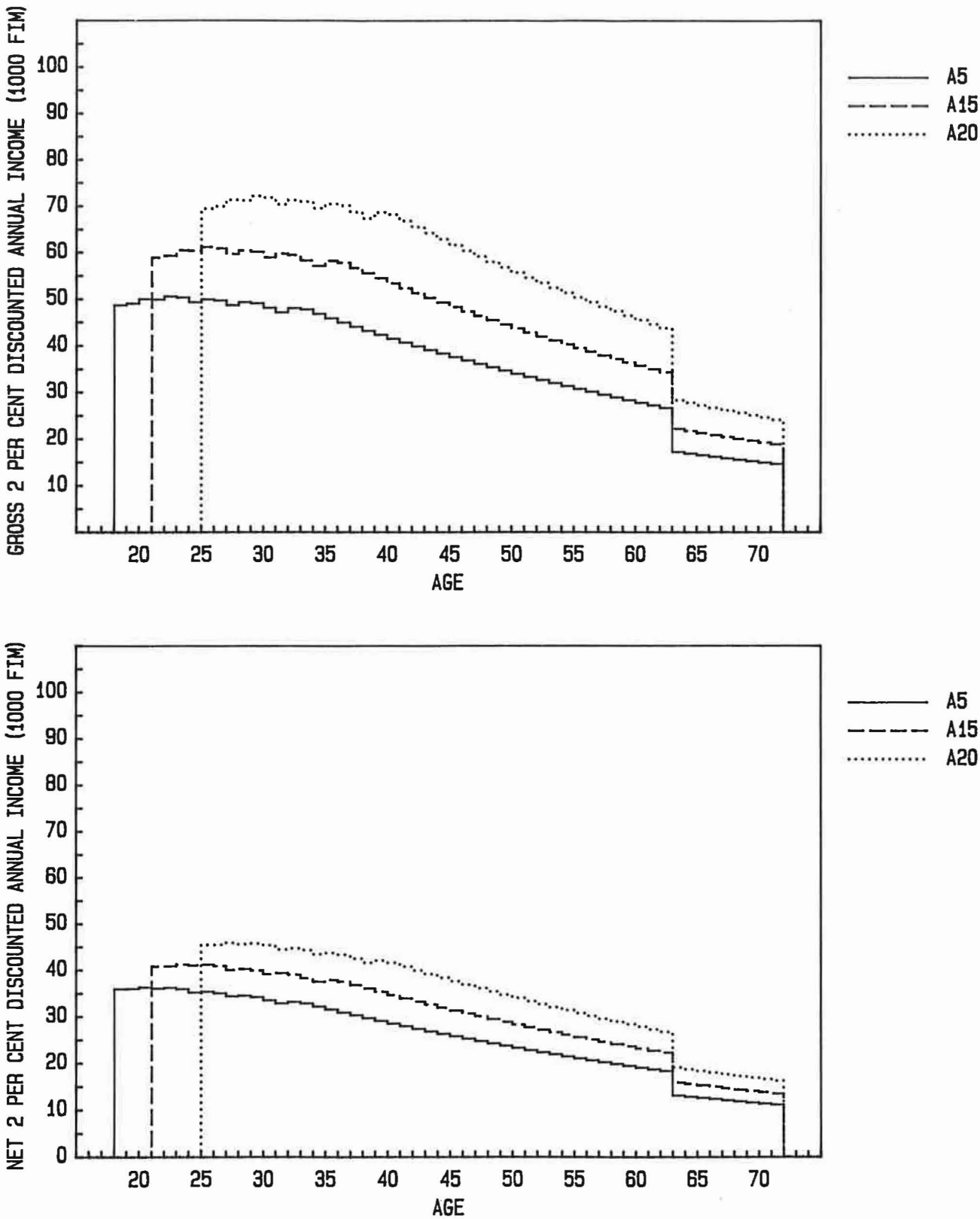
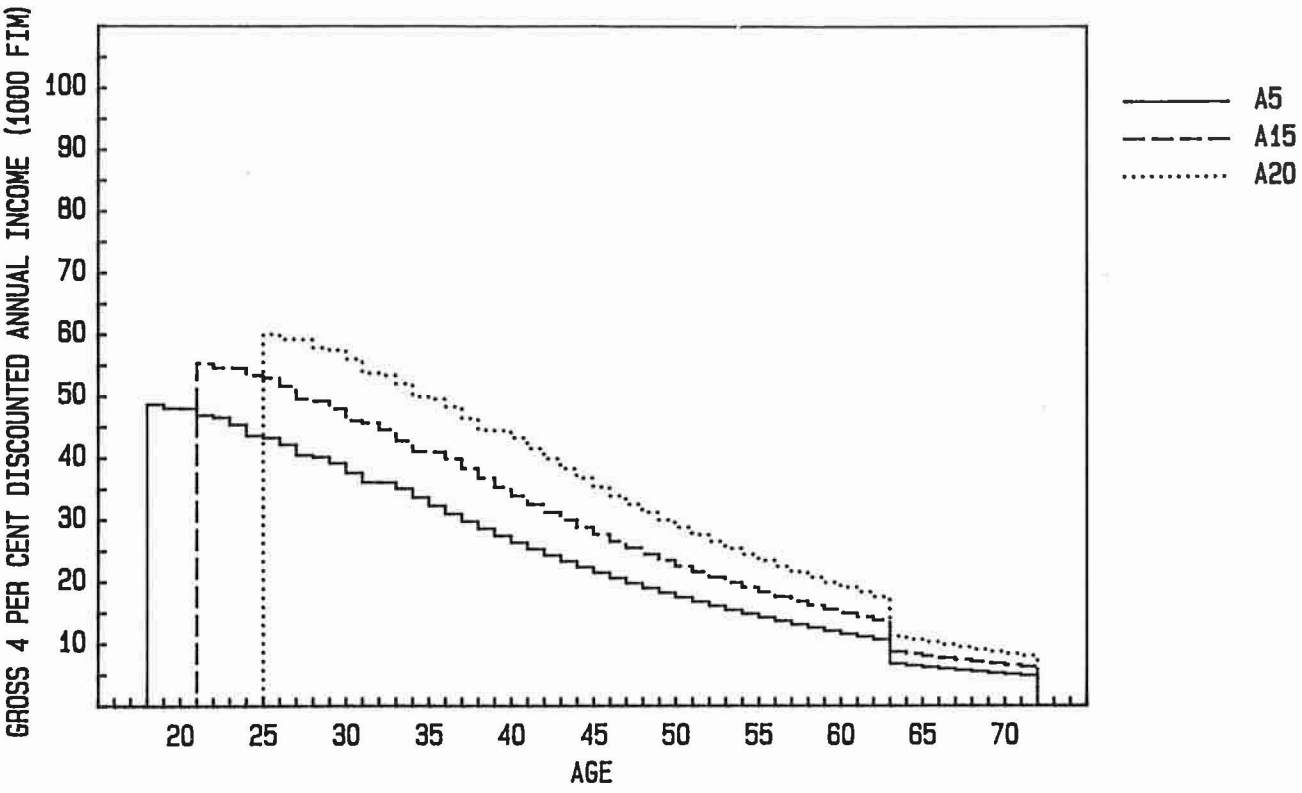


Figure 3.4 Gross and net annual incomes, discounted at 4 per cent: Salary grades A5, A15, and A20.



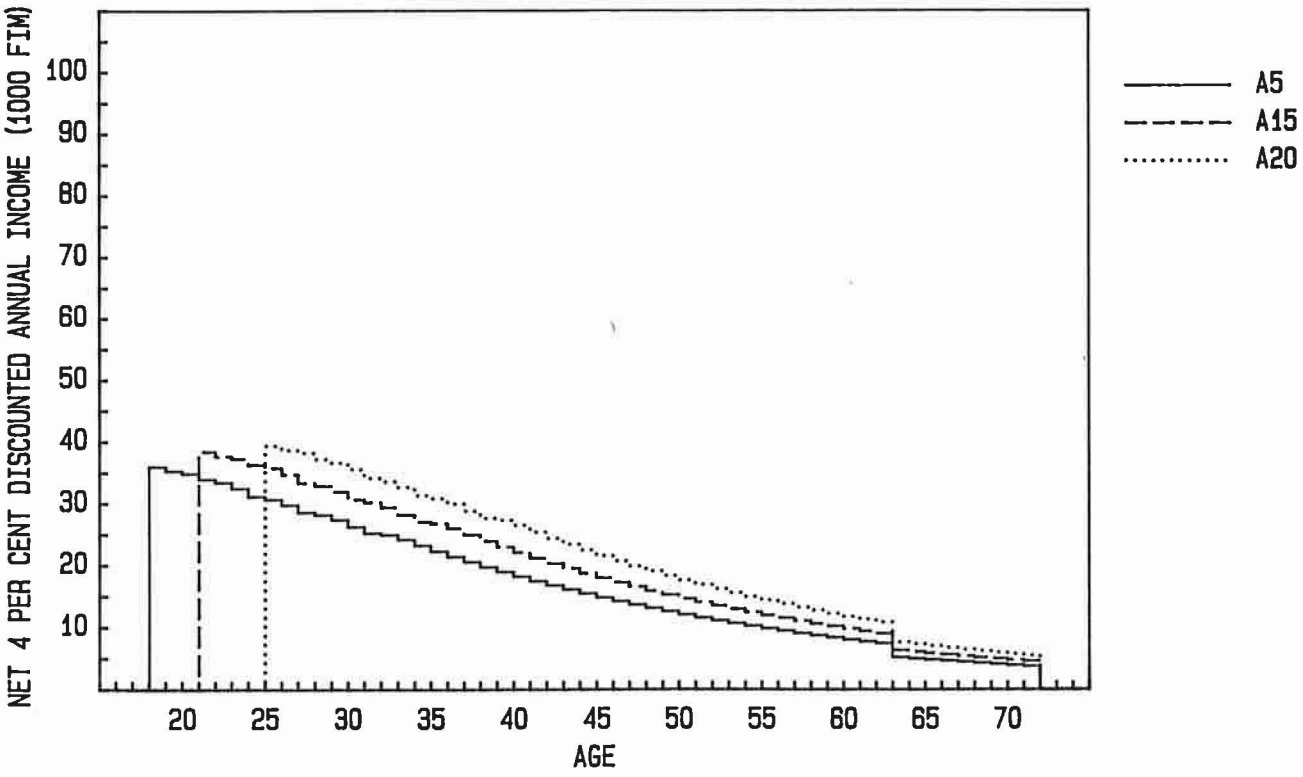
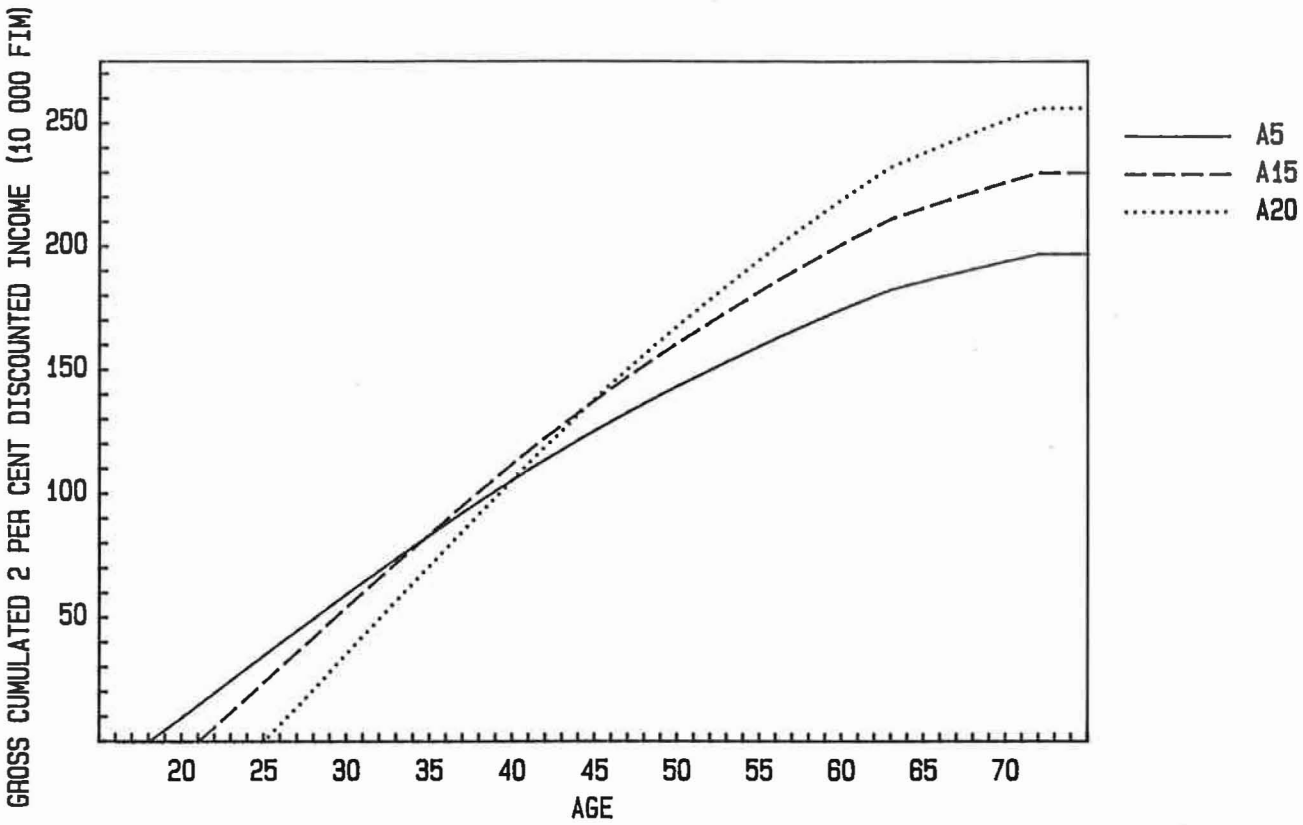


Figure 3.5 Cumulated gross and net incomes, discounted at 2 per cent: Salary grades A5, A15, and A20.



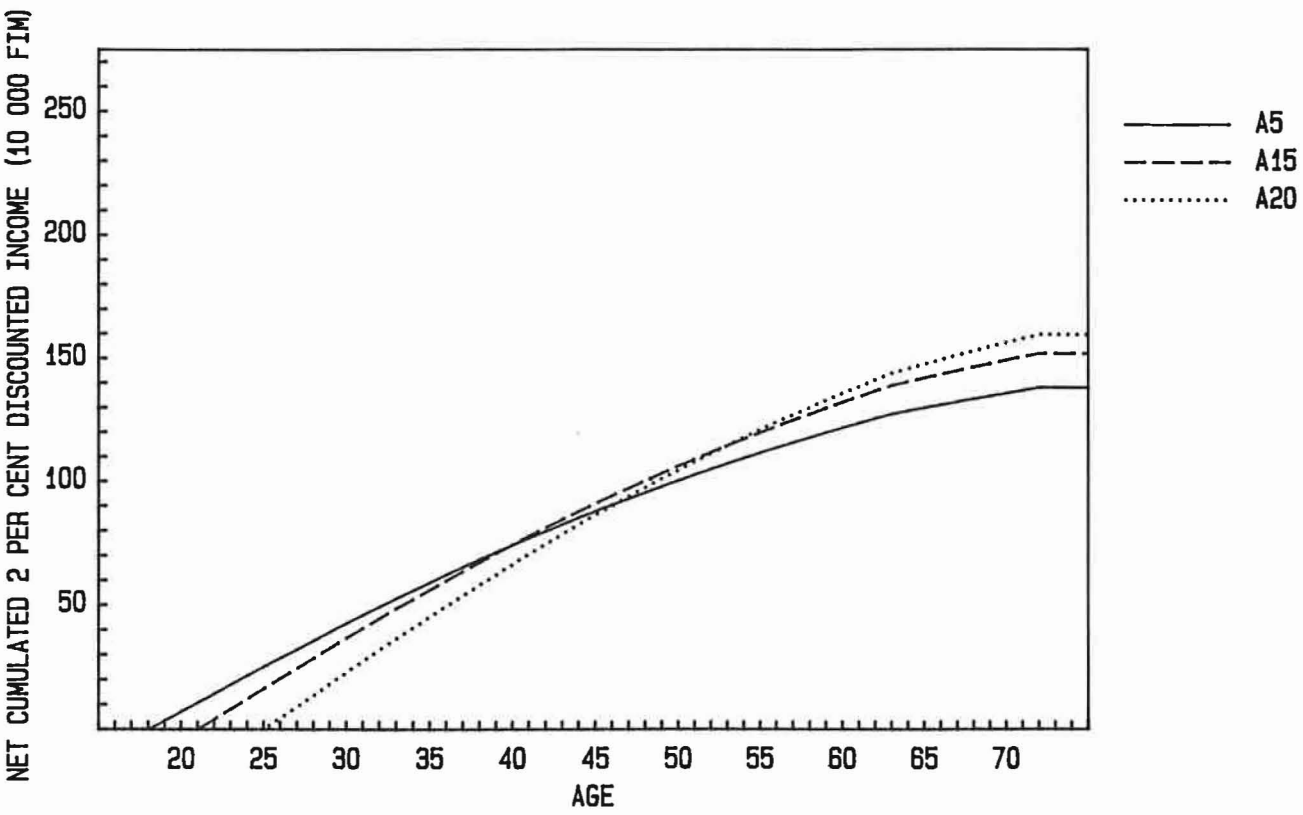
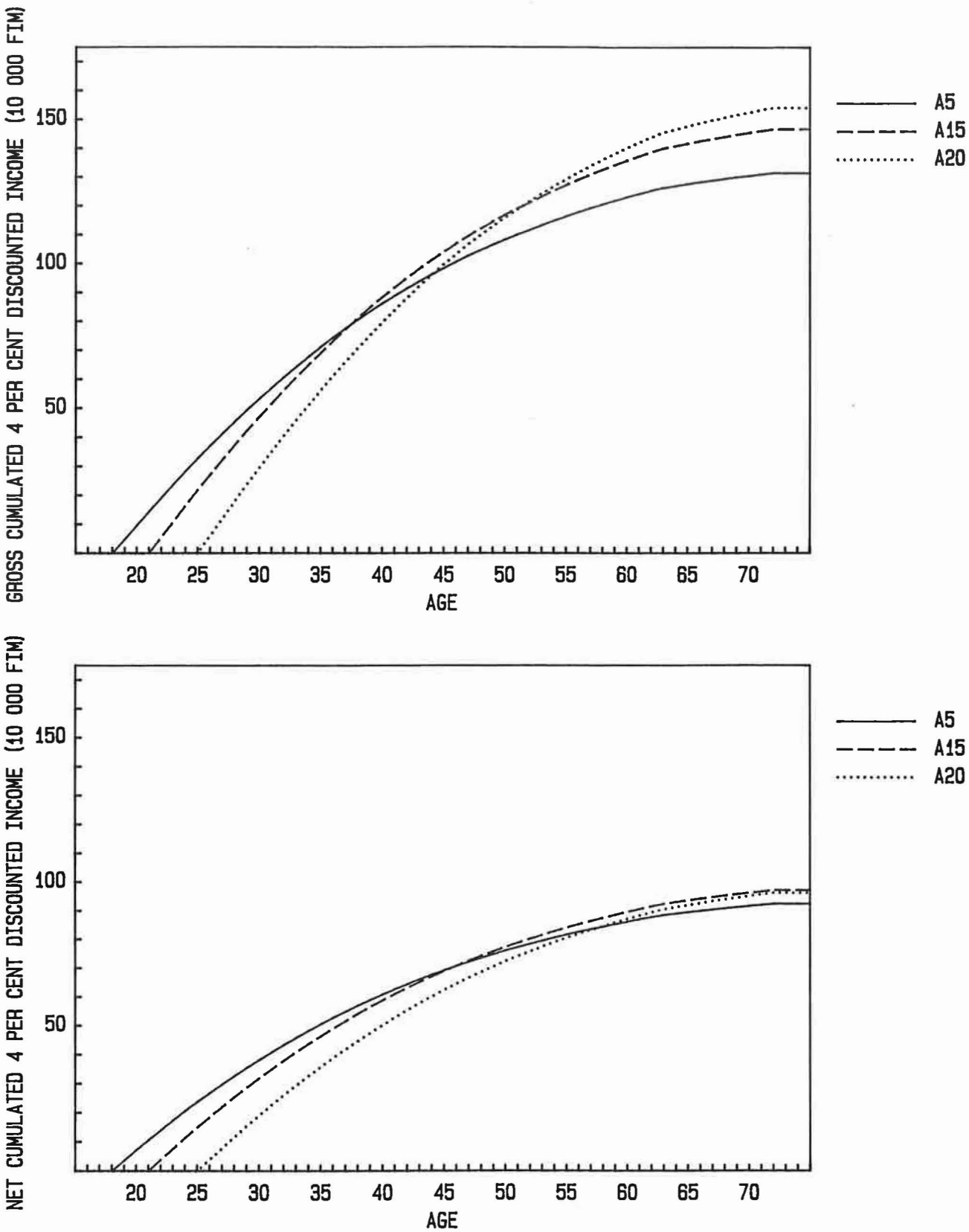


Figure 3.6 Cumulated gross and net incomes, discounted at 4 per cent: Salary grades A5, A15, and A20.



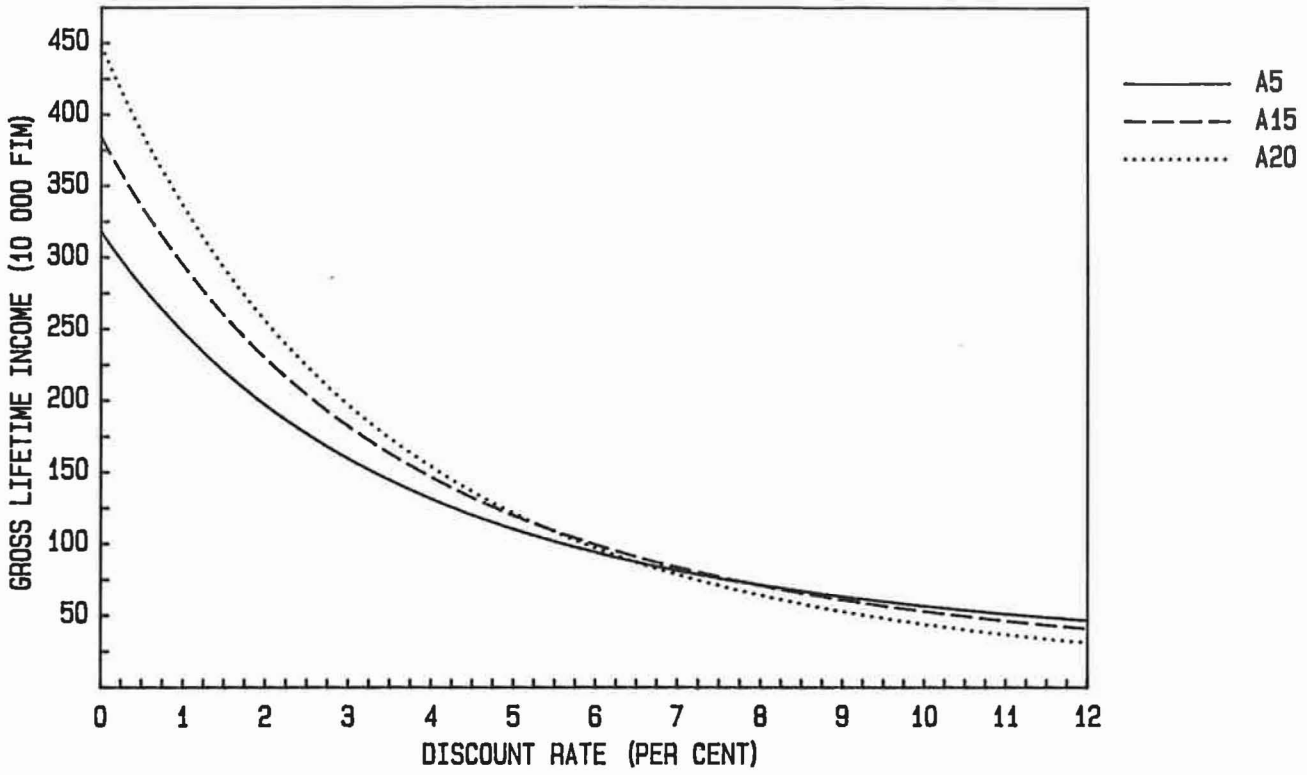
incomes are presented, and in Table 3.2 a summary of the gross and net lifetime incomes at different discout rates is given. As can be seen from the Figures and the Table, the differences in lifetime income between the careers may largely be reduced by discounting. For instance, when comparing the A5 and A20 career, the 41 per cent advantage of the A20 nominal gross lifetime income is reduced to merely a 4 per cent advantage when looking at the net lifetime income, discounted at 4 per cent. And, perhaps more remarkable, at a discount rate of 4 per cent, the A15 career beats the A20 when it comes to net lifetime earnings !!

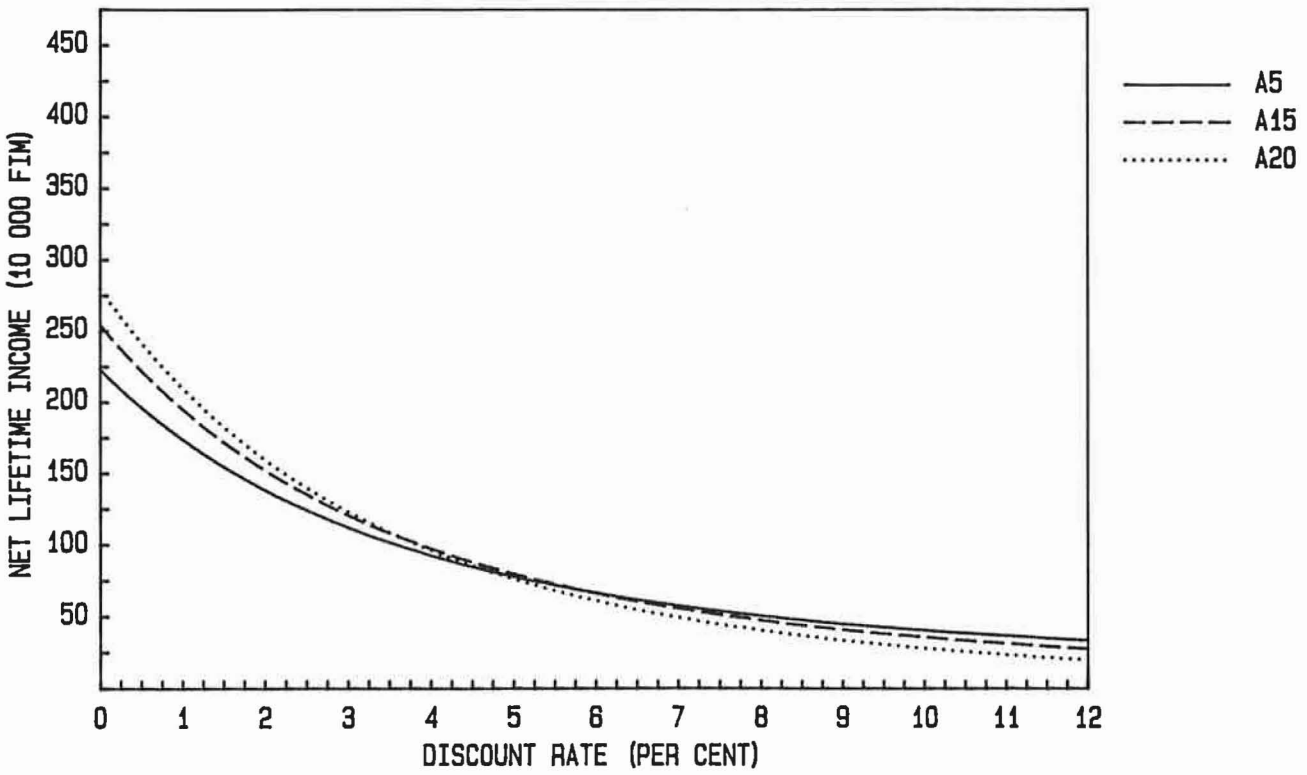
Table 3.2 Gross and net lifetime incomes, discounted at 0, 2, and 4 per cent (the numerals in brackets relate the income levels to the corresponding A5 value).

Career	Discount rate	Lifetime income, 100000 FIM	
		Gross	Net
A5	0 %	31.84 (100)	22.32 (100)
	2 %	19.71 (100)	13.80 (100)
	4 %	13.16 (100)	9.23 (100)
A15	0 %	38.46 (121)	25.45 (114)
	2 %	22.98 (117)	15.19 (110)
	4 %	14.67 (111)	9.70 (105)
A20	0 %	44.86 (141)	28.00 (125)
	2 %	25.59 (130)	15.95 (116)
	4 %	15.41 (117)	9.61 (104)

Obviously, the crucial element within this context is the discount rate: If the annual incomes are discounted at an increasing rate, the A5 career - having an intial lead of 3 (7) years compared to the A15 (A20) - will eventually turn out as the having the highest payoff. In Figure 3.7 this fact

Figure 3.7 Gross and net lifetime incomes at different discount rates: Salary grades A5, A15, and A20.





is illustated[r/], by plotting discounted gross and net lifetime incomes against discount rates in the range from 0 to 12 per cent.

Looking at the net income profiles in the bottom of the Figure, it may be seen that if our young man bases his career choice discounted net incomes, then the A20 career should be prefered at discount rates below 3.7 per cent, the A15 at rates between 3.8 and 5.8 per cent, and, finally, the A5 at rates above 5.9 per cent.

4. IMPLICATIONS FOR INCOME INEQUALITY

As noted in the Prelude the notion of income inequality is crucially dependent on the accounting period. In this section this fact is illustrated by applying the well-known Gini coefficient as a measure of inequality to the income figures from Section 3.

To simplify the ideas we start out from a model society in which the individuals belong to either of three subsets, each with an equal number of persons and with a uniform age distribution. The members of the first subset are assumed to be predetermined for the A5 career, the members of the second for the A15 career, while the third subset will choose the A20 incomecareer.

Hence, at any given point of time the income distribution in the three-subset society will be a simple mixture of the income levels illustrated in Figure 3.1. Treating individuals presently investing in further training (the A15 age group 18-20 and the A20 age group 18-24) as having zero incomes, any annual 'snap-shot' will imply a Gini coefficient of .192 (gross income) or .161 (net income) for the age groups 18-71. In Table 4.1 the annual Gini coefficients within the A5, A15 and A20 subset are given. The Table also includes the annual Gini coefficient within the merged society, plus coefficients calculated on the basis of lifetime incomes, discounted at 0, 2, and 4 per cent.

The annual income inequality within the isolated population subsets reveals an intrinsic feature: The inequality within the A20 subset exceeds the income inequality among the A15 servants, wich in turn exceeds the Gini coefficient within

the A5 group. Yet, when individual incomes are accumulated over more than one year, the corresponding 'within subset'

Table 4.1 Gini coefficients for annual and lifetime incomes in the three-subset society.

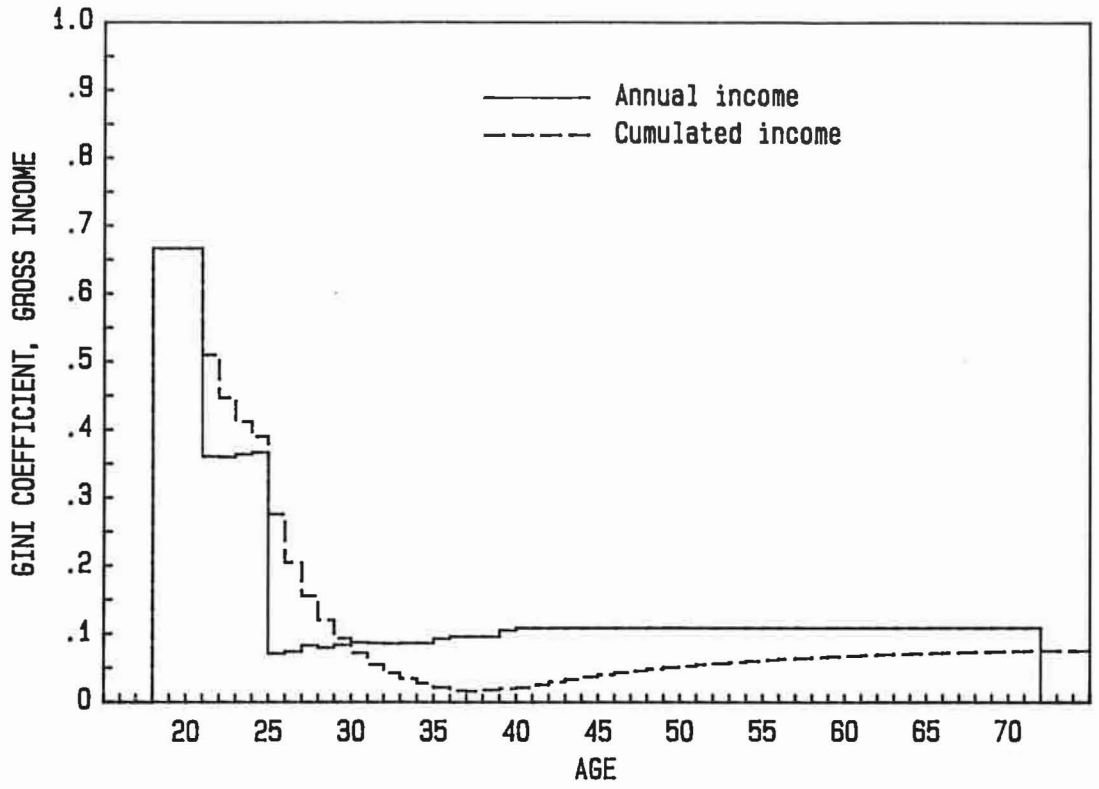
INCOME CONCEPT	GINI COEFFICIENT	
	Gross income	Net income
Annual		
A5 subset	.070	.054
A15 subset	.124	.109
A20 subset	.196	.181
Merged	.192	.161
Lifetime		
0 % discount rate	.075	.050
2 % discount rate	.057	.032
4 % discount rate	.035	.011

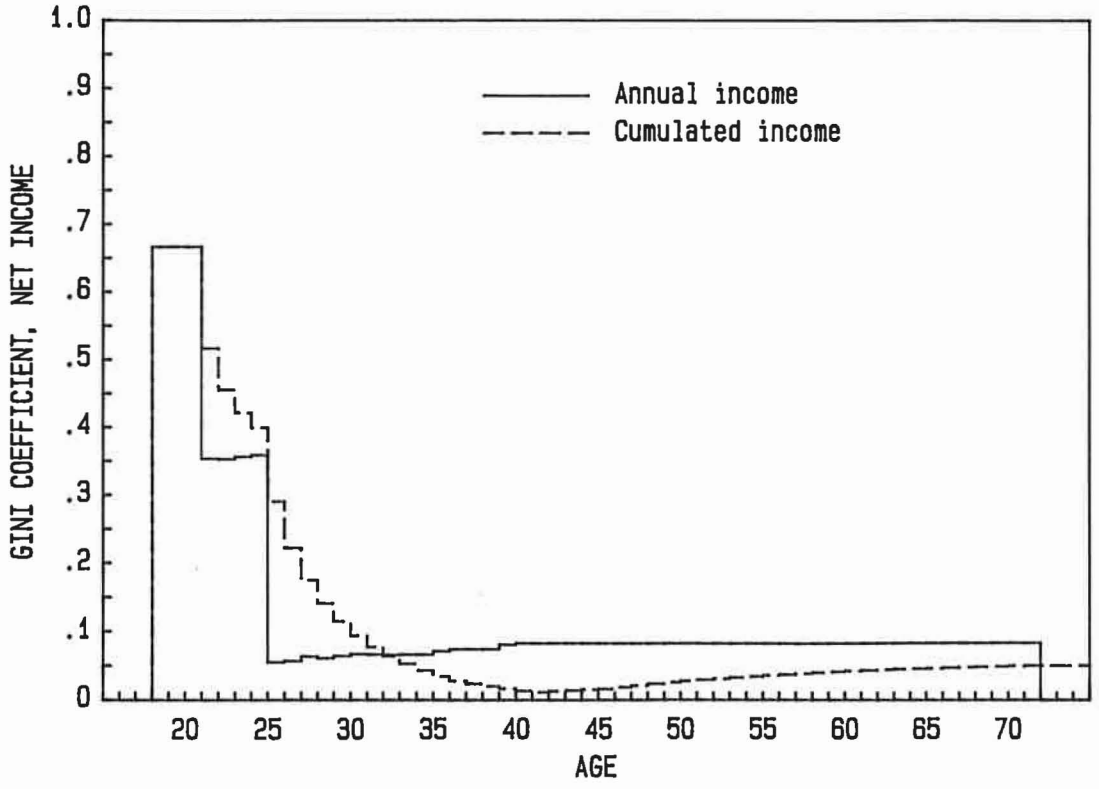
Gini coefficients will tend to decrease and at the limit, accumulating over the life span, the individuals reach their lifetime income and the Gini coefficient within each subset reduces to zero.

In our model society, a similar pattern emerges when taking the perspective of an age cohort, presently 18 years old, and examining the distribution of its prospective earnings: The fact that one third (the A5 part) of the cohort enters the labor market straight away, while the remaining two thirds choose further education for 3 or 7 years, is directly reflected by the annual Gini coefficient.

In Figure 4.1 the cohort's inequality profile is sketched in the case of yearly and cumulated gross and net earnings. The inequality of annual incomes shows two remarkable drops: At age 21, when the A15 group has completed its schooling, the initial gross (net) income Gini coefficient of .667 reduces to .361 (.354), followed by a second drop to .072 (.055) at

Figure 4.1 Gini coefficients at different ages in the model society: Gross and net income.





age 25, when the A20 part of the cohort joins the labor force. The accumulated income inequality develops in a quite akin fashion: Starting from a level of .667 the Gini coefficient of gross (net) cumulated income decreases to a minimum of .016 (.011) at age 37 (41), and then slowly increases to reach the final lifetime value .075 (.050), given in Table 4.1. Accumulating discounted incomes would lead to even larger inequality reductions over the lifetime, as shown in Table 4.1.

5. CONCLUSIONS AND FINAL REMARKS

The simple lesson to be learned from the desk calculations is that although focusing on annual incomes only may be the proper procedure for comparing incomes in the short run, it may badly distort comparisons of economic welfare when the time horizon is placed further away. This fact is perhaps best illustrated by the calculations in Section 4, where e.g. the A20 subgroup in the model society 'suffers' from an annual net income Gini coefficient of .181. Yet, by assumption, the members of A20 group are in the long run equally well off. Looking at the calculated lifetime incomes, issues associated with the choice between further education and straightaway labor market entrance should not be overlooked: Although schooling is expected to pay off as higher annual salaries, the lifetime payoff crucially depends on the spell of further education, with associated low (zero) incomes, and the anticipiated discount rate.

Obviously, several objections may be raised against the over-simplified framework adopted in this paper.
Objections concering details of our basic setup (Sections 2 and 3) could well be taken account of without principally changing the approach: For instance, treating individuals investing in further education as having zero incomes is rather remote from their behaviour in the real world. All the same, introducing a modest non-zero income amount during education would not overthrow the framework.
In addition, we could readily abandon the rigid assumption of a definitive choice of salary grade to allow for movements from one grade to another during the career, relying on real

'representative' career developments (as in Zettermark [1983]) or using probability transition matrixes.
Similarly, we may relax the assumption of fixed 1985 conditions during the lifetime by specifying a probability distribution for possible changes in the salary agreements, taxation schemes, and inflation rates.
With these modifications, the annual real income would be a random variate, and the lifetime payoffs of optional careers could be evaluated by calculating their expected values (and variances, if we wish to take the possibility of risk evasion into account).
However, besides making the analysis more complex, this would hardly add anything essentially new to the picture.

On the other hand, it must also be realized that the adopted approach, placing its focus on only economic (income) matters, may be doubted for more fundamental reasons.
Apparently, there are many other aspects associated with career choices and the resulting lifetime earnings patterns: Opportunity versus choice related issues, social status aspects, and labor/leisure considerations, to mention only a few. The influence of these aspects on lifetime income can not be taken into account without a drastic switch of approach.

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APPENDIX A. SALARIES AND TAXES IN FINLAND 1985

A1. CIVIL SERVANT SALARIES

Appointments by the Finnish public service are mainly paid according to a scheme with salary grades ranging from A1, representing the lowest grade, to A32, representing the highest. The monthly salary depends, besides on the salary grade, on the appointment's place of location (a regional division into two location groups according to cost of living). For simplicity, the calculations in this paper are based on appointments situated in Helsinki (representing location group 1).
Commencing and final monthly salaries for some salary grades, according to the salary agreements running from March 1, 1985, are presented in Table A.1 .

Table A.1 Commencing and final gross monthly salaries 1985.

Salary grade	Commencing salary	Final salary
A1	3 481	4 732
A5	3 758	5 108
A15	4 834	6 570
A20	6 174	8 391
A32	16 900	22 099

A civil servant moves from the commencing salary towards the final according to seniority: The salary rises after the first (by 6 %), third (6 %), fifth (5 %), eighth (5 %), eleventh (4 or 5 %), and fifteenth (1.5 or 4.5 %) year of service. Seniority also affects the length of the yearly vacation: Initially, the servant is entitled to a two days

leave per month of service, after the first full year of service the vacation is extended to five weeks, and after the fifteenth to six weeks. This aspect of senority is indirectly reflected in the annual earnings through an additional vacation fee, to which the servant is entitled, corresponding to one half of the ordinary salary during the vacation.

After retirement at age 63, the annual income reduces to 66 per cent of the income prior to retirement.

Closer details of present salary agreements are found in e.g. Virkamieskalenteri [1984].

A2. TAXATION

Incomes in Finland are principally subject of two types of taxes: A proportional municipal income tax, imposed by the local municipality, and a state income tax, acting according to a progressive scheme. Both taxes are determined annually on the basis of {taxable income}, derived from gross income by subtracting a set of deductions.

The calculations in this paper are based on the - not fully realistic - assumption that no deductions can be made from gross income in the municipal taxation. Similarly, regarding state taxation, minimal deductions are assumed, implying that only {income acquisition}, {wage}, and {salary} deductions are subtracted from the gross income to determine the taxable income. In Table A.2 a summary of the assumed determinants of the taxable income and tax rates is given.

Finally, Figure A.1 outlines the municipal, state, and aggregate tax rates as a function of taxable income.

Table A.2 Taxable income and tax rates in municipal and state taxation 1985.

MUNICIPAL TAXATION :

Taxable income = gross income

Tax rate = 19.5 per cent (approximate Finnish average)

STATE TAXATION:

Taxable income = Y - D1 - D2 - D3

Y = Gross income

D1 = Income acquisition deduction =
= 350 + 0.04Y, if Y < 26250 FIM
1400 , if Y > 26250 FIM

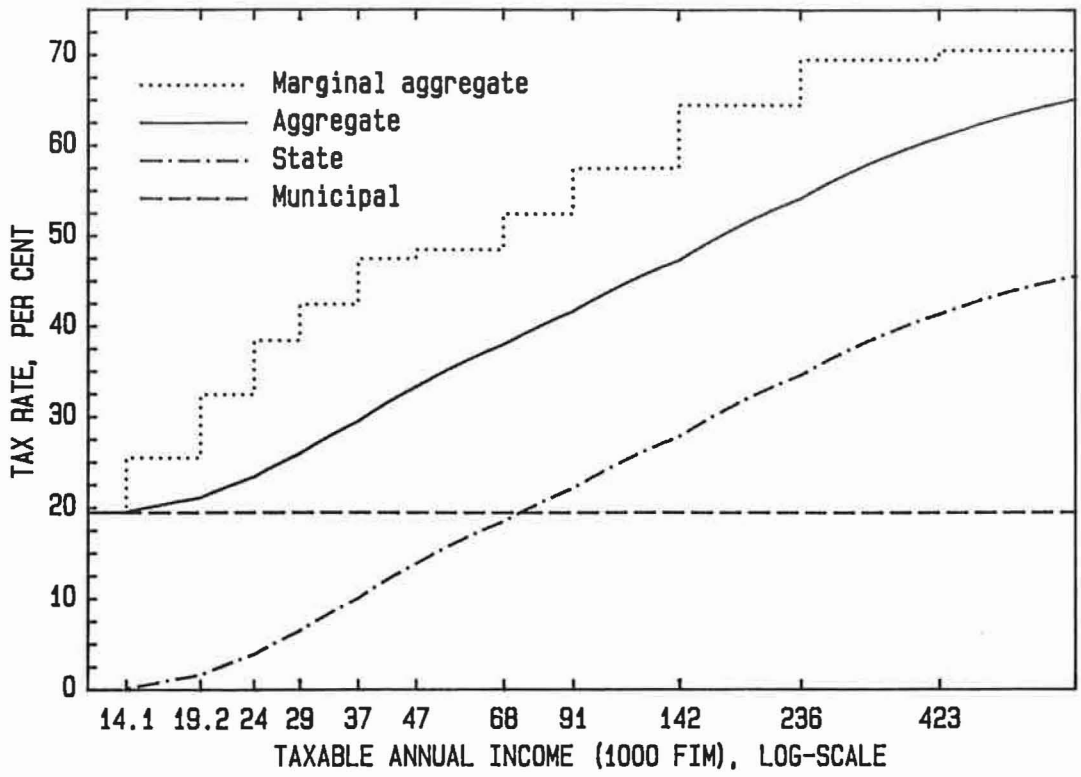
D2 = Wage deduction = 0.25(Y-D1), if Y-D1 < 43200 FIM
10800 , if Y-D1 > 43200 FIM

D3 = Salary deduction = 0.01(Y-D1), if Y-D1 < 80000 FIM
800 , if Y-D1 > 80000 FIM

Income tax according to the following table:

Taxable income FIM	Fix tax amount at the lower bound	Tax rate (per cent) for income exceeding the lower bound
14100- 19200	10	6
19200- 24000	316	13
24000- 29000	940	19
29000- 37000	1890	23
37000- 47000	3730	28
47000- 68000	6530	29
68000- 91000	12620	33
91000-142000	20210	38
142000-236000	39590	45
236000-423000	81890	50
423000-	175390	51

Figure A.1 Municipal, state, and aggregate tax rates in Finland 1985.



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