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Abstract

All societies have to face the problem that individuals cannot support themselves by their own work during all periods of life due to, for example, sickness, unemployment, disability, widowhood, and old-age. Three main ways to provide for those without earnings capacity can be distinguished: the family, the market and the State. In most societies all three ways co-exist, with one of them being dominant. The family model is dominant in developing countries, while a State model in the form of pay-as-you-go public pension is most common in industrialized nations.

In this essay we focus on loss of working capacity due to old-age, with special focus on gender. We analyze different ways to organize public pension systems and give the pros and cons of different features with respect to gender. The main objective of a pension system is to relieve poverty in old-age, but also to offer an insurance against an (unexpected) long life. Will a certain design favour women more than another design and in what respect? The first part of the paper analyses pension system from a theoretical point of view and examines to what extent the pension schemes in China, France, Ghana, Jordan, Mexico, Poland and Sweden have features that are advantageous to women. In the second part we focus on empirical evidence mainly from the Swedish pension reform.

We identify the following features as being important to prevent poverty among women and to secure income replacements. A pension system should:

- *be public and mandatory in order to make unisex life tables possible;*
- *provide economic incentives for women to work in the formal sector;*
- *not punish women by giving them a lower rate of return on lifetime contributions than men;*
- *not punish child rearing;*
- *provide a minimum guarantee;*
- *index pensions;*
- *provide joint-and-survivor annuities, which provide continued benefit payments to a surviving spouse;*
- *allow accrued pension rights to be divided in the event of a divorce.*

These features are important because women's labour market behaviour differ from men. In particular women work more part-time, have more interrupted careers and are lower paid. Furthermore women have longer life expectancy and are more likely to become widows. It is important to provide adequate pensions and income replacement but a pension system should not compensate for gender differences in the labour market, as that would reinforce traditional gender roles and preserve discrimination in the labour market.

Ann-Charlotte Ståhlberg, et al.

Introduction¹

All societies have to face the problem that no one can support herself/himself by their own work during all periods of life. Examples are low earnings capacity due to, for example, sickness, disability, unemployment, child rearing and old-age. Thus, all societies have to organize support for those without own earnings capacity. Three broad ways can be distinguished: the family, the market and the State. In most societies all three ways co-exist, with one of them being dominant. The family model is the dominant one in developing countries, while in industrialized countries a State model in the form of pay-as-you-go public pension is most frequent.

In this essay we focus on loss of working capacity due to old-age, with special focus on gender. The main objective is to relieve poverty in old-age, but also to offer an insurance against an extra-ordinary (unexpected) long life.

Both the family model and the public (State) model are exposed to risks of changing economic and demographic conditions. That ageing puts a strain on the pension systems in the industrialized world has been thoroughly analyzed and remedies have been proposed. In formal, public systems increased dependency ratio can be handled by increases in the contribution rate, decreases in the benefit level, and by deferred date of retirement. As to deferred retirement, the trend is, as is well known, actually the opposite, causing further pressure. Increased labour force participation and employment would lead to a lesser burden for those of active age. Measures for increasing female labour force participation and working hours might be an option.

However, the ageing process is even faster in developing countries than it ever was in the industrialized world. Urbanization and changing family patterns put a heavy strain on the extended family or village support and make these informal security systems less reliable. To exchange the informal systems for an extended, formal, mandatory system may, however, not solve the problem.

The fast ageing is shown in Table 1, both historically and forecasts.

¹ For a more comprehensive study see Ståhlberg et al. (2004a, 2004b).

Table 1. Per cent of elderly persons of the total population (1975, 2000 and 2030)

Country	1975 65+	80+	2000 65+	80+	2030 65+	80+
France	13.5	2.5	16.0	3.7	24.0	7.5
Sweden	15.1	2.7	17.3	5.0	25.1	8.6
Poland	9.5	1.2	12.3	2.1	22.2	5.5
China	4.4	0.6	7.0	0.9	16.0	2.9
Mexico	4,0	0,7	4,3	0,6	10,2	1,9
Ghana	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Jordan	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Source: United Nations, 1999, and United States Census Bureau, 2000 (from An aging world, 2001).

Ageing is caused both by increases in life expectancy and decreases in fertility. These are shown in Table 2.

Table 2. Life expectancy and fertility

Country	Life expectancy at birth ¹		Remaining life expectancy at age 60 ¹		Fertility rate ¹
	Men	Women		Women	
France	75	83	1.8	26	1.8
Sweden	78	83	1.3	25	1.3
Poland	70	78	1.3	21	1.3
Mexico	70	76	2.5	22	2.5
China	69	74	1.8	20	1.8
Jordan	70	73	4.3	19	4.3
Ghana	56	58	4.2	18	4.2

¹ Source: The World's Women 2000: Trends and Statistics.

² Source: United Nations.

We may thus conclude that reforming the systems of support for the elderly has to be given top priority. In this essay we analyze different ways of organizing pension systems. We give the pros and cons of different features with special reference to gender aspects. An aspect of special interest here is that men and women have different patterns of work history, with women having a lower participation rate in the formal labour market, interrupted careers in response to child rearing, and lower wages. Also, women have longer life expectancy than men and more often become widows than men become widowers. These differences may influence the consumption possibilities in old-age depending on how the pension system is designed. Pension benefits will reflect labour market behaviour. But it is important not to compensate for gender differences on the labour market in pension systems, as that would merely reinforce traditional gender roles and preserve discrimination in the labour market.

Will a certain design favour women more than another design? In what respect? By this analysis we find a basis for decisions on pension reforms.

The study is organized as follows: in section 1 we analyze pension design features and gender. Section 2 gives a description of pension rules with respect to gender in a number of countries, while section 3 highlights gender differences in the labour market. Section 4 gives empirical evidence of gender effects of pension reforms and last section concludes the essay.

1. Gender and pension design features

Pension systems and their reforms may have different impact on men and women. Will a certain design favour women more than another design? In this section we describe pension systems by their design features and analyze the expected effects on incentives, pension benefits and income distribution for men and women. Here focus is on theoretical aspects. Some empirical evidence will be given in the final section.

1.1. Public – private, mandatory – voluntary

The choice of public-private, mandatory-voluntary in itself has no gender effect on incentives and redistribution. However, if the intention is to have a common risk pool of men and women, that is to use unisex life tables, then the system has to be public and mandatory. Because the premiums are the same for men and women, they will be set to reflect women's longer life expectancy. This means that men on average will pay more into the system than they receive in benefits. In this respect a public mandatory system favours women.

A mandatory system poses a restriction on consumption in early years which is more binding in low-income groups. This disfavours women.

1.2. Pay-as-you-go – funded

Pay-as-you-go (PAYG) or funded has by itself no gender effect. This depends on the link between contributions and benefits. If for example pensions are closely tied to contributions there are strong incentives to work in the formal market and there is not much of redistribution.

If women are more dependent than men on the public pension system (the public pension is a greater share of their assets), women are more exposed to the risk of low economic growth (the rate of return in a PAYG) and, vice versa, less exposed to the risk of a low rate of return in the capital market and the higher volatility in returns in the capital market. If a funded system has individual accounts, women tend to choose low risk investments that may lead to lower pensions for women.

1.3. Means-tested, fixed benefit, minimum guarantee – earnings-related

Basic pensions independent of former income provide a social safety net for the old, particularly the old whose lifetime income was low. To accomplish this, the benefit formula could be flat or means-tested or could provide a minimum pension guarantee.

A basic pension with a flat benefit favours low earners, i.e. mostly women, in the sense that they will get a higher rate of return and sometimes also a replacement ratio higher than 100 per cent. This type of benefit has few marginal effects, though there will be incentives mainly in the lower part of the income scale not to supply labour to the market, which may create a poverty trap.

Means-tested benefits can be more clearly targeted towards those in need, thus favouring women as a group. But it also means that women are more exposed to high marginal effects (i.e. the sum of the tax rate and the rate of withdrawal of the benefit), which affects their labour supply and savings. Women's labour supply may be more sensitive than men's since net wages may influence women's allocation of time between market work, which is taxed, and work at home, which is not taxed.

A means-test in which only the individual's own pension counts as "means", i.e. a minimum pension guarantee, discourages voluntary personal savings less when younger, and transfers from members of the extended family less when older in comparison with a means-tested flat benefit.

Earnings-related benefits make paid work an attractive option. By creating an obvious link between reported incomes and future benefits, employment-based social insurance schemes encourage people to participate in the formal economy.

1.4. Earnings-related and defined benefit

A weak link between contributions and benefits means a subsidy to non-market activities. This reduces work incentives especially among women. Low incomes result in low pensions. If the system subsidizes non-market work, women get a higher rate of return on their contributions than men do. If benefits are based on final wages men are favoured as they have steeper age earnings profiles.

1.5. Earnings-related and defined contribution

A defined contribution (DC) plan means a tight link between contributions and benefits and thereby strong incentives for work in the formal market. There are no redistributions. Low incomes result in low pensions.

1.6. Redistributational – actuarial

To study distributional effects it is necessary to consider both the benefits and the way they are financed. The basis for evaluating interpersonal redistribution is an actuarially fair insurance. An individual's lifetime contributions are compared with her or his expected lifetime benefits.

The life expectancy of women is higher than that of men. An actuarially fair insurance must therefore have higher contribution rates or lower pensions for women than for men. Systems which treat men and women equally (rely on unisex life tables), as public systems often do, redistribute income in favour of women. Life expectancy also varies between different income groups.

An actuarially fair pension system is redistributionally neutral. But usually the link between contributions and benefits is not perfect, particularly not in defined benefit plans. Certain rules favour certain women while putting others at a disadvantage. If an individual's pension is determined by the income of the best or final years, while pension contributions are proportional to income over all years women who alternate between non-market work and market work are at an advantage. If the number of years required to qualify for a full pension is less than the number of potential years of contribution, for example women who take a break from gainful employment while they have young children are at an advantage. Women who continuously work part-time or have low wages throughout their working lives, on the other hand, are at a disadvantage under these rules. These rules favour high earners. If there is a ceiling on benefits but not on contributions, high earners (mostly men) are at a disadvantage.

Although few empirical studies have examined how defined benefit (DB) pension systems with earnings-related benefits and contributions systematically redistribute lifetime income between women and men, one study of the Swedish public pension as it was prior to the 1998 pension reform found that the average ratio between expected lifetime benefits and lifetime contributions was higher for men than for women, that is men had a higher rate of return on lifetime contributions than women. Female unskilled blue-collar workers had the lowest benefit-cost ratio of all because this group includes women who both work for many years and have a weak wage progression over time. Female low-wage earners therefore get the least benefit out of their contributions to the earnings-related scheme (Ståhlberg, 1989).

1.7. Pension age

In DB plans, women are often permitted to retire earlier than men. When benefits are not adjusted in an actuarially fair manner, women could increase their lifetime benefits by retiring early. A higher retirement age would add to the supply of older workers and yield a fiscal saving.

In DC plans which act on an actuarially fair basis, lifetime benefits do not increase if women retire early. Actuarially fair benefits will induce women (men) to postpone retirement voluntarily compared to a DB system with early retirement subsidies.

1.8. Indexation

Indexation before and after retirement is crucial for both men and women. Women as a group gain more with indexation of annuities since it especially benefits long-lived individuals and groups. If the real wage growth is positive, it is especially important for women to have a system with wage indexation. As they have a longer retirement period price indexation make them fall behind the standard of living of the working generation to a greater extent than men do.

1.9. Survivors' pensions

Most social security systems pay a survivor's benefit. The majority of the recipients are women, because women's life expectancy is higher than men's, and husbands are often a bit older than their spouses. However, this is not redistribution in favour of women. If there were no survivor's pension, a couple would have to safeguard the income of the surviving spouse. Any private protection of the surviving person reduces the current consumption possibilities of the husband as well. The survivor's pension is therefore redistribution in favour of couples. Single men and women subsidize one-career families. Two-career families subsidize one-career families who get the same benefit for only one contributing member. This gives incentives to wives to stay at home or to work in the informal sector. In certain social security systems women have to give up their own pension when they receive the widow's pension. This greatly impacts women's incentive to work in the labour market.

The DC pension allows a choice of joint-life pensions (with spouses) and also allows pre-retirement transfers of pension rights between spouses. This means that married men could buy joint-survivor annuities. The payout to the husband would reduce in order to leave a reserve to fund a survivor's benefit. Single men would receive a higher annuity relative to their married counterparts. But if households are myopic, or if the husband places greater weight on consumption when he is alive, the widow may not have an equivalent amount in a voluntary system.

1.10. Pension credits for child rearing

In PAYG-systems families with an above average number of children create benefits for the rest, particularly for those without any children: everybody benefits from the labour of the next generation. Families with children could therefore be entitled to some support for raising children, regardless of their income.

1.11. Annuities

Workers who are myopic might spend their retirement savings long before they are dead. Annuities, which provide lifetime insurance, are important especially to women who are expected to live longer than men. Because the voluntary nature means more of a problem for women, mandatory annuities favour women more than men.

In Table 3 we summarize the conclusions from this section.

It follows that to avoid poverty among women in old-age a pension system should:

- be public and mandatory in order to make unisex life tables possible;
- provide economic incentives for women to work in the formal sector;
- not punish women by giving them a lower rate of return on lifetime contributions than men;
- not punish child rearing;
- provide a minimum guarantee;
- provide joint-survivor annuities;
- allow accrued pension rights to be divided in the event of a divorce.

Table 3. Overview, conclusions (+ means an advantage for women, - a disadvantage, 0 no effect or effects men and women equally, and ? means that the effect is indeterminate)

Feature	Consequences for women as a group			
	Work incentives	Saving incentives	Effects on distribution	Pension benefits
Public/Private	0	0	0	0
Mandatory		?	+, - (+ l'emporte)	
Means-tested; household income and assets	-	- (dans des groupes à revenue faible)	+	+
Basic pension; flat, uniform benefit	0 ou -		+	+
Minimum pension guarantee; own pension tested	-	0	+	+
Earnings-related, DB	+		+	?
Earnings-related, DC	+		0	- ou 0
PAYG	0		0	?
Funded	0		0	0
Actuarial	++	0 ou +	0	- ou 0
Redistributional	- ou ?		?	?
Indexation			+	
Price index (positive growth rate)	0 ou +	+?	-	
Wage index (positive growth rate)	?	?	+	
Interest (if interest rate > growth rate)	?	?		0
Pension age			+ ou 0	
Actuarial	+	+	0	0
Non-actuarial	-	-	+	0
Survivors' pensions				
Actuarial (voluntary)	0	-	0	?
Actuarial (mandatory)	0 ou +	-	0	?
Non-actuarial	0		?	?
Annuities			+	

Note : + means an advantage for women, - a disadvantage, 0 no effect or effects men and women equally, and ? means that the effect is indeterminate.

2. Pension rules and gender: Selected national experiences²

In order to examine to what extent the selected countries China, France, Ghana, Jordan, Mexico, Poland and Sweden tend to have pension schemes according to the description above we give an overview in Table 4 and Table 5 of relevant pension rules in these countries.

Coverage in developing countries is in many cases restricted to urban workers and certain categories of workers such as civil servants and military personnel. Rural workers have little or no pension coverage in much of the developing world. Informal (usually family) systems provide the bulk of social support for older persons in many countries, particularly in Africa and South Asia. Most developing countries have public social security systems although they are far less important than existing family based systems.

² For a fuller description, including references, see Ståhlberg et al. (2004a).

Table 4. Overview of the selected countries' pension rules mainly of advantage to women

	China	France	Ghana	Jordan	Mexico ¹	Poland	Sweden
Public pension rules mainly of advantage to women							
Mandatory	yes	yes	yes	yes	yes	yes	yes
Coverage	10 % of labour force ²	all employees	10 % of labour force	25 % of labour force ²	all employees	all employees	All residents
Earnings-related	yes	yes	yes	yes	yes	yes	yes
Actuarial	yes ³	no	no	no	yes	yes	yes
Minimum pension⁴	yes (if 15 years of work)	Yes means-tested	no	yes (private employees)	yes (if 25 years of work), pension tested	yes (if 25 years of work for men, 20 for women), pension tested	yes pension tested
In per cent of average wage	20 % ⁵	25 % of average wage of full-time employees ⁵		n.a.	33 % of average wage (men) 46 % of average wage (women) ⁶	25 % of average wage ⁵	40 % of an average industrial workers wage
Pay-as-you-go	yes	yes	yes	yes	yes	yes	yes
Funded	yes	no	no	no	yes	yes	yes
Mandatory actuarial survivors' pension/joint annuities	yes	no	no	no	yes	no	no
Credits for child-rearing	no	yes	no	no	no	no	yes
Pension age, men	60	60	60	60	65	65	65
Pension age, women	55	60	60	55	65	60	65

	China	France	Ghana	Jordan	Mexico ¹	Poland	Sweden
Public pension rules of advantage to certain women and of disadvantage to other women							
Non-actuarial system; benefits calculated on final years disfavour women (and men) with flat life income profiles	yes ³	yes	yes	yes	no	no	no
Mandatory non-actuarial survivors' pension	yes	yes	yes	yes	no	yes	yes

¹ Private sector.

² 2000.

³ Non-actuarial for civil servants and employees of State organizations and institutions.

⁴ The number of years required for a minimum pension induces low-income women to withdraw from the labour market as soon as the requirement is fulfilled. Thus, these women get a low lifetime income. It is a subsidy from women (and men) who continue working.

⁵ 2002.

⁶ 1997.

Table 5. Social security contribution rates and replacement rates

	China (urban private workers) (%)	France (%)	Ghana (%)	Jordan (private workers) (%)	Mexico (private workers) (%)	Poland (%)	Sweden (%)
Contribution rate	27.0 ¹	14.75 of insurable earnings plus 1.6 of total payroll ³	17.5 ⁵	17.35 ⁷	6.5 ⁸	19.52 ⁹	18.5
Replacement rate	58.5 ²	75-80 ⁴	50 ⁶	n.a	n.a.	n.a.	50-55

¹ Zhu (2002).

² The target replacement rate for a retiree with 35 years of contribution (Zhu, 2002).

³ The contribution rate of the general social security scheme covering private sector employees (SSPTW, 2002).

⁴ Includes compulsory supplementary pensions.

⁵ SSPTW (2003).

⁶ The minimum pension. It is increased by 1.5 percentage points for each 12-month period of contributions beyond 240 months (SSPTW, 2003).

⁷ SSPTW (2003).

⁸ James et al. (2003).

⁹ Muller (2003).

All selected countries have a mandatory public pension. However the coverage varies from 10 per cent in China and Ghana to 100 per cent in countries like France and Sweden. Using unisex life expectancy tables is crucial for women. Unisex tables favour especially women in France, Sweden and Poland. At age 60 they are expected to live 5-6 years more than men. This was shown in Table 2. In Ghana, Jordan and Mexico the differences in life expectancy are small.

Most countries have some kind of minimum pension. This is pension-tested in Mexico, Poland and Sweden, means-tested in France. In the basic pension for urban workers in China no pension is payable to those with less than 15 years of work, in Poland the eligibility criteria for a minimum pension are 25 years for men and 20 for women, while in Mexico at least 25 years are required. This high eligibility requirement may exclude most women. Workers in China and Poland close to the minimum have little incentive to work in the formal sector beyond the years required for eligibility. It reduces labour supply especially among low paid women. In Mexico the government adds to the worker's individual account a uniform amount for every day worked. This encourages work in the formal sector. Those who work more get more. It is a redistribution primarily to people who are poor because of low wages throughout their lives rather than to people who are poor because they only worked part of their lives.

The earnings-related pension in Mexico, Poland and Sweden and the basic pension for urban workers in China have a tight link between contributions and benefits. These pension systems are DC plans with actuarial design. In France, Ghana and Jordan the pension systems are DB plans with non-actuarial design. Benefits are linked with contributions, but in a very loose

way. Benefits are determined by the best or final salary which means a subsidy to all kind of non-market activities. It reduces work incentives, favours certain women by giving them a high rate of return on lifetime contributions but disfavors other women giving them a low rate of return. Women (men) with uneven lifecycle income pattern win while women (men) with flat lifecycle income pattern lose under these rules.

In the Swedish system there is a child credit regardless of income and not restricted in the sense that the parent has to abstain from market work. France gives pension credits for more than three children.

Only Mexico's pension system requires men and women to purchase joint-survivor annuities that cover their wives (husbands). In reality this imposes an implicit cost on married men that takes the form of a lower monthly payout while they are alive. The State-financed survivor's pension in China, France, Ghana, Jordan and Poland is a redistribution in favour of couples especially one-career families and gives incentives for wives to stay at home or to work in the informal sector. In Poland the widow must choose between her own pension and the widow's pension which in addition depresses the wife's incentive to work.

Women have a lower pension age than men in China, Jordan and Poland. In DB systems women who retire earlier are subsidized.

3. Pensions, labour force participation rates and wages

Women traditionally work less in the labour market and earn less than men. Thus a pension system that has a tight link between benefits and contributions is likely to produce lower benefits for women. To what extent depends on women's labour force participation and employment and on women's earnings. But a high minimum guarantee may have adverse labour supply effects.

In an actuarial system, an adequate pension requires a high labour force participation rate and a high employment rate. As shown in Table 6 Sweden has the highest female labour force participation rates followed by France and Poland, with Mexico far behind. According to Table 5 women work part time to a greater extent than men. In an actuarial system they will accordingly get a lower pension. Women typically earn less per hour than men, despite age and education. In Sweden women earn 91 per cent of male earnings, while in China it is as low as 54 per cent. This is shown in Table 7.

Table 6. Labour force participation and part-time work

Country	Labour force participation, per cent of population age 15-64			Share of part-time work in employment			
	Men	Women	Total	Share of total employment	Share of women's employment	Share of men's employment	Women's share of all part-time work
France	75.3	62.0	68.6	14.2	24.3	5.3	80.1
Sweden	79.8	75.0	77.4	14.0	21.4	7.3	72.9
Poland	72.8	59.8	66.2	12.8	17.9	8.8	61.7
Mexico	90.2	42.4	65.0	13.5	25.6	7.1	65.1

Source: OECD, *Labour Force Statistics 1980-2000*.

Tableau 7. Annual hours worked and earnings

Country	Annual earnings (EUR) ¹	Women's earnings as a share of men's earnings ²	Annual hours worked ³
France	21,884 (2002)	78	1,532
Sweden	26,480 (2002)	91	1,603
Poland	5,708 (2002)		
Mexico	5,099 (2002)	70	1,863
China	1,149 (2001)	54	
Jordan	3,634 (1998)		

¹ Source: OECD, 2002 (France, Sweden, Poland, Mexico), ILO labour statistic database (China and Jordan), annual gross earnings, unweighted mean for all sectors (Jordan), authors' conversion to Euro (China and Jordan).

² Source: *The World's Women 2000: Trends and Statistics*.

³ Source: *OECD Employment Outlook*, Statistical Annex, p. 320.

If countries want to encourage women and men to engage in paid work and enjoy economic independence, they need to link pension rights to the extent that an individual participates in gainful employment. However, if such a pension system is to yield equal economic outcomes for women and men, countries could introduce measures to achieve equal division of time put into the home and the labour market and should abolish the gender discrimination that prevents women from attaining and aspiring to higher-paid jobs. Pending such a situation, the pension system should provide economic incentives for women to gain education and paid work. The pension system is not able to fix problems in the labour market.

4. Pension reforms and gender issues³

Few empirical studies have examined how pension systems systematically redistribute lifetime income between men and women. James et al. (2003) estimated gender effects of the pension reforms in Chile, Argentina and Mexico. The old pension systems in Chile, Argentina and

³ For a more comprehensive study see Ståhlberg et al. (2004b).

Mexico were DB plans and PAYG. One's pension was determined by the wages or salary received during one's final working years together with the number of years worked. The new pension systems are DC funded systems with individual accounts. Besides this, Chile has a guaranteed minimum pension, Argentina a flat benefit pension and in Mexico the government adds to the worker's individual account a uniform amount for every day worked (plus a minimum-guarantee), i.e. those who work more get more. In the old systems married women received a tax-financed widow's pension. In Chile and Argentina women had to relinquish their own pensions when they received widow's pension. In the new systems married men pay for a joint annuity and the widow can retain her own pension while receiving a widow's pension.

Women in Chile, Argentina and Mexico receive a lower DC pension than men. Women have lower wages and spend less time in the labour force than men. Any pension system that has a tight link between benefits and contributions is likely to produce lower benefits for women. Despite this, women have a higher rate of return on their lifetime contributions than men. This is due partly to the first pillar, which is directed to low-wage earners, and partly to the joint annuity.

To these assessments of the gender effects in James et al., we add our own estimates of the Swedish pension. This is one part notional defined contribution (NDC), and another part financial individual accounts (IFF). The NDC part mimics an IFF scheme, while remaining pay-as-you-go financed. Crucial features in the Swedish pension with reference to gender aspects are:

- Benefits are closely tied to contributions and consequently there is not much redistribution.
- Pension credits for child rearing favour women.
- The ceiling (indexed by wages) on benefits but not on contributions (above the ceiling half of the contributions are paid) redistributes income in favour of low earners and thereby in favour of women.
- Unisex life tables redistribute income in favour of women.
- The (pension-tested) guarantee pension redistributes income in favour of low earners and thereby in favour of women.

The tight link between contributions and benefits encourages market work from early age and continuously. The child credit is not restricted in the sense that the parent has to abstain from market work.

4.1. A simulation model

In order to illustrate how the Swedish pension system affects women's pension benefits, we calculate benefits and contributions for groups of "typical" women. In constructing the groups, we build on James et al. (2003).

The groups include:

- Full career woman: same labour force participation and retirement age as men – works full time for most or all of her career.
- Full time/part-time woman: working full time until having children, alternates between parental leave and part-time as long as the children are small and then goes back to full time work.
- 10-year woman: participate in the labour force during ten years early in life, before marriage and birth of children.
- Part-time woman: women who work part-time for most of her career.

For each case, a wage profile is constructed using earnings data from Statistics Sweden for five levels of education (no upper secondary school, upper secondary school, undergraduate education ≤ 2 years, undergraduate education > 2 years, postgraduate education).

Our measures are:

- annual own annuities;
- replacement rates calculated as the annual benefit as a per cent of final salary;
- rate of return calculated as present value of expected lifetime benefits divided by present value of lifetime contributions.

In all these measures we calculate the ratio between women/full career men. A gender ratio of 1 means that men and women have the same replacement rate, annual annuities etc. A gender ratio greater (smaller) than 1 means that women have a higher (lower) replacement ratio, higher annual annuities etc. than men.

4.2. Results

Outcome for women is shown in Table 8. We give the women/men ratio of annual own annuities, replacement rate and rate of return on lifetime contributions for typical earnings profiles.

Table 8. *The ratio between typical women's and full career men's annual own annuities, replacement rate and rate of return on lifetime contributions*

	Women/Full career men			
	Full career woman	Full time/part time woman	10-year woman	Part-time woman
Annual own annuities	0.83-0.99	0.79-0.84	0.35-0.41	0.62-0.67
Replacement rate	1.00-1.22	0.96-1.17	1.22-1.45	1.04-1.25
Rate of return	1.15-1.28	1.17-1.23	3.07-3.92	1.19-1.32

The results show that women on average get lower pension benefits than men. Despite this women have a higher replacement rate and a higher rate of return on lifetime contributions than men. Part-time women's annual pension is 62-67 per cent of full career men's. However, they have a replacement rate of 4-25 per cent higher than men's and a rate of return which is 19-32 per cent higher than men's. If for example men's rate of return is 3 per cent part-time women have a rate of return which is 3.6-4.0 per cent. Full-time/part-time women have a rate of return which is 17-23 per cent higher than men's. The 10-year woman gets the minimum pension guarantee. Her rate of return on lifetime contributions is 300-400 per cent higher than men's.

Despite lower benefits women have a higher replacement rate and a higher rate of return on pension contributions than men. This is due to the unisex life tables, the minimum pension guarantee and the pension credits for child rearing.

The distributional effects of unisex tables are high whereas the child credits have less influence on women's pension amounts.

Conclusion

Old age support comes from many sources. In this paper we focus on public pensions. We have identified the following features being important to prevent poverty among women and to secure income replacements. The pension system should:

- be public and mandatory in order to make unisex life tables possible;
- provide economic incentives for women to work in the formal sector;
- not punish women by giving them a lower rate of return on lifetime contributions than men;
- not punish child rearing;
- provide a minimum guarantee;
- provide joint-survivor annuities;
- allow accrued pension rights to be divided in the event of a divorce.

These features are important because women's labour market behaviour differ from men. In particular women work more part-time, have more interrupted careers and are lower paid. Furthermore women have longer life expectancy and are more likely to become widows. It is important to provide adequate pensions and income replacement but a pension system should not compensate for gender differences in the labour market, as that would reinforce traditional gender roles and preserve discrimination in the labour market.

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