

## **Gender Issues in NDC Systems**

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## Abstract

NDC plans are not generically biased for or against women. However, the way they are implemented can affect men and women differently, due to their differing employment and demographic trajectories. Except for the earlier retirement age permitted for women in Poland, practically no gender-specific provisions remain in NDC countries, but many provisions have subtle gender impacts. On the one hand, compulsory annuitization together with the required use of unisex tables in the NDC pillar and minimum or flat pensions in the safety net pillar favor women. On the other hand, the likely absence of an increase in real NDC pensions over the retirement period, the move toward price indexation of the safety net benefit, the shift from pure to phased-out flat pensions (in Sweden and Norway) and cutbacks in survivors' benefits without a replacement in the form of joint annuities will have negative consequences for women.

While the NDC pillar was designed to encourage work, disincentives for women remain through the earlier legal retirement age for women (in Poland), the high implicit tax in systems with non-contributory minimum pensions or phased-out flat benefits, and arrangements that force widows to choose between their own contributory pensions and survivor's pensions. The position of very old women is likely to deteriorate as a consequence of their earlier retirement in the face of a longer life expectancy, a time stream of real benefits in the NDC pillar that is likely to remain stable (or even to fall) rather than rising over the retirement period, little or no linkage to economy-wide wages in most safety nets, and cuts in survivor's benefits. These work disincentives could be removed and very old women better protected, without imposing a cost on others, by equalizing retirement ages for men and women in countries where this has not yet been done, shifting some retirement resources to very old age by using a low imputed interest rate in initial NDC payout calculations and allowing benefits to rise if actual wage growth is higher, reconfiguring safety net arrangements so their implicit tax affects a smaller group, and requiring each spouse to provide, from his or her NDC accumulation, a joint pension that covers the widow(er), as an add-on to the widow's own contributory pension.

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NDC plans are designed to eliminate the work disincentives and non-transparent redistributions of DB social security systems, without the transition costs and risk-shifting that occurs in the context of a switch to a funded DC system. To a large extent, they sweep away special privileges that, intentionally or inadvertently, accrued to various groups in traditional systems, and pay everyone in accordance with their own contributions. However, not surprisingly, these new provisions will have different impacts on diverse population sub-groups, including men versus women. Most of these impacts do not stem from explicit gender-specific provisions in the plans, but rather from the interaction of gender-free policies with differing demographic and employment characteristics of men and women. The same policies affect the two genders differently because of the more limited labor force attachment of women due to their child-bearing and child-rearing roles, their lower earnings when they work, their longer life expectancy and the likelihood that they will eventually become widows and live alone in very old age. Although these differences were not at the forefront when NDC systems were designed, they require a careful re-evaluation in the fine-tuning process that is going on now.

From one vantage point, the same gender issues arise in all types of pension systems: Decisions must be made about retirement age, earning-related pension amounts and safety net programs, which have gender implications for the reasons given above. But certain gender-related issues become much more salient in DC plans than they are in DB plans, and others are easier to resolve in NDC plans than in FDC plans. I concentrate on these salient issues and differences.

Both FDC and NDC plans make certain design choices explicit that were implicit in DB plans. While this allows for more informed decision-making, it can also be politically sensitive and divisive. Policy-makers must decide how to convert the retirement accumulation (whether notional or financial) into a stream of periodic payouts—through decisions about pensionable age, annuitization, imputed interest rate and indexation method, which affect men and women differently. Additionally, systems with dominant DC plans must make their redistributive goals explicit through the choice of safety nets, survivor benefit programs and use of unisex versus gender-specific mortality tables. These choices generate redistributions between men and women

and trade-offs among different sub-groups of women, in a way that is more transparent than in DB plans. Some policy choices (such as gender-differentiated retirement age) that benefit women in DB plans may hurt them in DC plans.

In some cases, the decision process is simpler for NDC plans than FDC plans. NDC plans do not have individual investments and therefore do not have problems that stem from decentralized investment decisions in FDC. For example, it is sometimes argued that women are more risk-averse than men, and this will lead them to make investments that have a lower (and less volatile) expected rate of return, therefore smaller pensions. This issue does not arise in NDC plans, where there are little if any assets, any assets that do exist are in a buffer fund covering the over-all system, asset management is therefore done centrally, and imputed interest rates are uniform for all. Also, NDC plans do not need to worry about whether a competitive annuity market will function well at the payout stage or how private insurance companies will react if unisex mortality tables are required. Since the stream of payouts is not funded, private insurance companies are not involved and payouts are simply made by the central authorities on a pay-as-you-go (PAYG) basis. In this sense, policy-makers have greater discretion than they do in FDC plans that have multiple decentralized decision-makers, each with his or her own preferences and information. We throw light on how they have used this discretion.

This paper focuses on key choices that must be made in NDC plans that have gender implications: retirement age (Part I), payout terms (Part II), safety net provisions (Part III) and arrangements for survivors and the very old (Part IV). An earlier legal retirement age for women seems like a perk but contributes to their lower pensions. Because women tend to earn less than men, safety net provisions are crucial to their welfare; but if not carefully crafted can induce behaviors that maintain their dependent state. Because women live longer than men they face a greater risk of running out of money; so rules regarding annuitization, indexation, survivors' benefits and joint pensions determine their standard of living—and do not always protect the very old, who are disproportionately women. For each design feature, I lay out some general analytic points and then describe the empirical situation—trying to distinguish between choices that tend to be made in NDC versus FDC systems and between effects that are inherent versus discretionary in NDC plans. Gender-related characteristics of current and projected NDC systems in Sweden, Poland Latvia, Italy, Norway and Egypt are summarized in Table 1. Table 2 shows the impact of joint annuities and unisex tables.

A basic tension becomes apparent between the work incentive and fiscal discipline ethos of NDC pillars versus the more general poverty prevention and consumption-smoothing goals of the over-all old age and survivor systems in which they are embedded. Women tend to be at the core of these tensions. Safety net and survivor policies that are designed to protect the elderly from low incomes often discourage the incremental work that is needed for women to achieve financial independence. Policies changes that save money for the public treasury, such as reduced indexation and widow benefits, often come at the expense of the very old--a growing group, most of whom are women. The Conclusion suggests steps that might produce better work incentives and protection for women, without increasing the burden on others.

### **I. Retirement Age** (Table 1, rows 1-2)

All three systems—NDC, FDC and DB--must make explicit decisions about “normal” retirement age (age at which every covered person is allowed to receive a pension), pre-conditions for early retirement and gender differences in any of the above. Probably most analysts would agree that monthly pension amounts should fall for workers who take early retirement, that normal retirement age should rise as longevity increases, and that women should not have an earlier allowable retirement age than men. However, many DB plans contain the opposite provisions—little or no penalty for earlier retirement, no adjustment for longevity increase and earlier pension age for women. This leads workers to retire “too early” in the sense that they impose a heavy fiscal burden on the system’s financial pool and may end up with very low pensions in old-old age. Indeed, this was one reason for the switch to DC plans, which build in an automatic actuarial connection between contributions, age at which pension starts, future expected life span and benefit amount. Close examination of these new incentives suggest that they affect men and women differently.

#### **Actuarial fairness and unfairness in DB plans: the impact on retirement behavior**

In an actuarially fair pension system, 1) the expected present value (EPV) of lifetime contributions equals the EPV of lifetime benefits; 2) incremental contributions have the same EPV as the incremental monthly benefits that accrue; 3) postponing the start of pension raises monthly benefits enough to hold the lifetime EPV constant; and 4) a higher life expectancy results in a lower monthly pension, to spread a given EPV of contributions over a longer lifetime

(see Disney, Quaisser and Whitehouse 2006). “Actuarially fair” systems do not necessarily produce “equitable” pension distributions—the latter is a value judgment that depends on one’s concept of equity. But they do provide a neutral starting point from which deliberate transparent redistributions may take place to achieve equity. Conversely, actuarially unfair systems produce non-transparent redistributions that might not be considered equitable and that distort retirement incentives. Most DB systems are actuarially unfair.

In an actuarially unfair DB system the above equivalences do not hold, creating a tax wedge between gross and net remuneration. In many defined benefit formulae the incremental pension becomes little or nothing beyond some point and there is no reward for pension postponement. Empirical evidence shows that workers respond to these incentives, start their pensions as soon as they are allowed to do so and stop work at the same time (Gruber and Wise 1999 and 2004).

In contrast, DC plans (both FDC and NDC) build up retirement saving that equal contributions plus interest, the accumulation is converted to a pension with an equivalent EPV and any incremental contribution or pension postponement results in a commensurate increase in monthly benefits. That is, DC plans are supposed to be actuarially fair—the source of their positive work incentives. Workers—both men and women--have an incentive to postpone start of pension and to work longer, because they are compensated. And empirical evidence shows that workers respond positively to these incentives (Disney and Smith 2002, Lluberas 2007, Song and Manchester 2007, Edwards and James 2008). From this point of view, the choice of “normal” retirement age by policy-makers becomes less important, since workers may postpone pensioning and continue working beyond that point.

### **New and continued sources of actuarial unfairness in NDC plans**

But some sources of actuarial unfairness continue in mandatory DC systems and new sources are introduced—because they include some constraints that differ from individuals’ own preferences about retirement saving. For individuals to regard a plan as actuarially fair, the discount and mortality rates must reflect their own subjective discount rate and estimates of life expectancy. However, in mandatory DC plans many individuals have a higher discount rate than the system pays or they may expect to die younger than projected by system mortality rates. For example: a worker may be forced to save more than he would voluntarily choose; he may prefer to invest in a riskier portfolio with a higher expected rate of return than is permitted by system

rules; she wishes to use her saving to cover emergency or other consumption in the early years of retirement; or he may be in ill-health, hence does not expect to get back his full premium through annuities or gradual withdrawals. This disparity between plan regulations and individual preferences and circumstances will reduce the EPV of benefits below that of contributions and make the system actuarially unfair, as viewed by many individuals.

This deviation from actuarial fairness may be especially great in NDC systems, where the interest rate that accrues is uniform for all and depends on the growth rate of wages, which is usually lower than the market interest rate. Often the imputed real interest rate is 0 at the annuity stage. This lower interest rate is not inevitable in NDC plans, but it is a universal political decision, used to maintain the fiscal sustainability of the system, in the face of payroll-based revenues, rising dependency rates and a large legacy debt. But the individual's discount rate may be closer to the capital market rate—in fact, for non-savers it exceeds the capital market rate. Discounting at these higher rates, individuals will find that the EPV of incremental contributions exceeds the benefits that they get in return, maintaining in NDC plans part of the negative work incentives that are common in DB plans.

This negative effect may be less for women than for men. Some evidence suggests that women are more risk averse than men. If so, they are likely to be less dissatisfied with the lower but safer return on the NDC and to place a greater value on its insurance benefits. Additionally, unisex mortality tables are widely used in pension calculations in NDC systems. They are also used (implicitly) in DB systems, but in DB systems men can not readily calculate how the unisex approach affected their benefits, since mortality tables do not enter directly into the DB formula. In contrast, in NDC systems mortality tables enter explicitly into the calculation of benefits, as discussed in a later section. Unisex overstates the life expectancy of men, which reduces their benefits. When men do their own calculations—assuming they have roughly accurate information—they will find that the true EPV of their incremental contributions exceeds the EPV of their benefits. So they have an incentive to stop contributing and take their money out as soon as possible—even if they plan to go on saving. For women, unisex has the opposite effect. It raises the value of contributing and postponing, counteracting the negative impact of the low rate of return. Therefore, because of their reactions to the discount and mortality rates used, the deviation from actuarial fairness may be smaller and NDC work incentives larger for women.

But the safety net operates in the opposite way. As discussed below, it often imposes a high implicit tax on continued work by women, especially by low-paid women. As a result of all these factors, we would expect the shift to DC plans to produce the strongest positive impact on actuarial fairness and work on highly educated well-paid women and the weakest impact on low-earning women with partial attachments, with most men in-between.

### **Why do we need a legal retirement age and early retirement pre-conditions in DC plans?**

The logic of DC plans is that workers should have some control over their retirement age, since they pay the price. Early pensioning matters less, since individuals bear the cost of their decisions in terms of lower monthly benefits, rather than passing it on to others. Indeed, most NDC countries give some choice over retirement age.

But a possible conflict arises between respecting individual preferences about retirement vs. pursuing the social goals of poverty prevention and income equality. If given completely free choice, many individuals will retire at the earliest allowable age because of the myopia and actuarial unfairness just described.<sup>1</sup> Then, their pensions will eventually be lower than the minimum pension that most NDC countries guarantee, which would impose a fiscal burden on the public treasury, even if not on the NDC pillar itself. And their pensions will be even further below the wages of contemporaneous workers, which becomes an increasing source of inequality as pensioners age. These are the reasons why setting the “right” statutory retirement age and pre-conditions for early pensioning remains very important.

What should these ages be? The “normal” or “statutory” age should be set at the level where worker’s productivity is likely to fall and where most individuals have built up enough pension rights to last for the rest of his or her life. Workers could be allowed to pension early if they have earned a lifetime pension that is well above the minimum level guaranteed by the government (e.g. this rule is planned for the new NDC systems in Norway and Egypt and has been implemented in some FDC systems in Latin America). Women are less likely to meet this condition for early retirement because they have worked less steadily and live longer than men.<sup>2</sup>

### **Legal retirement age for women relative to men in DB and DC plans**

Ironically, and in contradiction of this criterion, in many DB and DC systems women’s statutory retirement age is earlier than that of men. The reason sometimes given is that women who worked in the market also worked at home, so in compensation for having two jobs they should be able to retire from one (their market job) earlier. Another possible explanation is that

husbands, who are generally older, want their wives to retire at the same time they do. But this rationale ignores the fact that women work less and live longer than men so, if anything, a higher pensionable age could be justified. It also ignores side-effects such as the reduced incentive for on-the-job training and wage growth for women when earlier retirement is expected (James 2009b).

Since women may not be aware of these side-effects and the financial cost of longer pensions is born by the system's pool, it is hardly surprising that women object to raising the statutory retirement age in DB plans. A lower age gives them additional years of leisure while paying little or nothing in terms of lower monthly benefits.

In contrast, in a DC system the women themselves bear most of the cost for an earlier retirement age by getting a lower monthly pension. In a typical FDC system in Latin America women's pensions would increase by 40-50% if they deferred their pension from age 60 to 65 and even more if they worked during those extra years (James, Edwards and Wong 2003 and 2008; James 2009b). Norway has estimated an increase of 35-40% from 5 years of postponed pensioning in its new NDC system (Christensen 2009). One would think that women would voluntarily work longer in DC plans to get the higher payouts, so raising the statutory retirement age would not be necessary. To some extent we have seen a voluntary adjustment, both by men and women, as countries like Chile shifted their social security systems from DB to DC (Edwards and James 2008). However, the earlier access to retirement savings is still very attractive—evidence of the high subjective discount rate and continued actuarial unfairness just discussed. As a result, in very old age women may find themselves with low incomes relative to the poverty line and to contemporaneous workers.

This outcome for the very old could be prevented by equalizing the statutory retirement age for men and women and, indeed, by raising it for both genders. Most OECD systems—both DB and DC—are moving in this direction, although it remains politically contentious. NDC countries are found in both camps. Latvia is equalizing the pension age for men and women, while Poland has been unable to do so.<sup>3</sup>

## **II. Payout Issues (Table 1, rows 3-9)**

Both NDC and FDC schemes must decide whether annuitization is mandatory, what forms the annuitization should take, whether unisex tables must be used, and whether the annuities should be price or wage-indexed. In general, mandatory annuitization protects women more than men, because they live longer and are therefore more likely to run out of money before death due to myopia if annuitization is not required. Indexation, especially wage-indexation, shifts retirement resources away from the young-old toward the old-old, where women predominate. The required use of unisex tables in benefit calculations redistributes from the average man to the average woman. This effect is enhanced by mandatory annuitization and indexation, because under unisex women are not charged extra for the fact that they predominate in the old-old age groups that benefit the most from indexation, and men cannot legally escape the cost. Unlike safety net arrangements that deter women's market work as they redistribute to women (see Part III), unisex requirements may encourage women's work by increasing their rate of return to contributions (but may discourage men's work for the converse reason).

### **Mandatory or optional annuities?**

Public DB plans, in principle, pay a pension for life; the option of lump-sum payouts is usually not even given. This is an advantage to women, some of whom live 30-40 years after retirement. In contrast, in a DC plan workers build their retirement savings, which they consume during their retirement period--but they don't automatically get a lifetime pension. If lump sum or flexible withdrawals are permitted, myopic workers may use up their savings well before their death. Women are especially prone to outlive their savings, because of their greater longevity and smaller voluntary saving. This is accentuated in households where husbands have dominant decision-making power over family resources and place greater weight on consumption during their own shorter lifetimes. When the husband dies, the wife is left with the risk of inadequate savings. Moreover, expected lifetimes have been increasing by about one year per decade—that is, an average person born a decade later will probably live a year longer. Workers may not take this into account in their calculations, basing their expectations on the experience of their parents, who had much lower expected life spans. Giving retirees discretion about the payout form from their DC accounts produces the danger that very old women will find themselves without a means of support.

Annuities solve this problem by providing longevity insurance to retirees. With annuities, retiring workers turn over their retirement savings to a (public or private) insurance company,

which takes on the longevity and investment risk and guarantees a monthly benefit for life. DC systems can protect workers from uncertainty and myopia by requiring or encouraging annuitization. This pushes some potential income flow and consumption into the distant future, thereby protecting society from the liability of supporting very old individuals, predominantly women, who have outlived their retirement saving. Thus, such rules are consistent with the dual objectives of avoiding poverty and controlling fiscal costs. However, individuals who prefer to spend their savings sooner, or are in ill health and expect to die young, or want access to their money during emergencies, will resist mandatory annuitization.

Countries with FDC systems have reacted in very different ways to these pushes and pulls. Lump sum withdrawals are allowed in Australia's mandatory DC plan, to make the accounts less restrictive and more attractive. Australia is counting on its flat public benefit to provide a floor on old age consumption. But if seniors use up their retirement savings quickly, this will put a big burden on the government's budget, as the population ages. And older women may find that their standard of living falls dramatically when they have used up their private savings. At the opposite extreme, annuitization is mandated in Sweden's FDC plan, to ensure that everyone has a lifelong income without imposing a cost on the public treasury. The annuities are provided by the same organization that handles NDC annuities, but retirees have a choice between fixed versus variable and individual versus joint annuities.<sup>4</sup>

In Chile (and most other Latin American FDC countries), retirees can choose between annuitization and gradual withdrawals, according to a schedule set by the regulator. Gradual withdrawals are permitted in these countries, in part because of their high degree of inequality. Low-income workers have much shorter life spans than high-income workers, so if both were put into the same mandatory annuity pool, the former would end up cross-subsidizing the latter—a perverse redistribution. Such redistributions are further reduced by the prevalence of guaranteed payment periods of 10-20 years, which are chosen by individuals who expect a short life span. Chile requires joint annuities for married individuals, recently began allowing variable annuities, allows gradual withdrawals backed up by a deferred annuity, and permits the withdrawal of a lump sum after the annuity size has passed a high threshold. Gender-specific mortality tables are used, so women get smaller monthly payouts than men for the same accumulation (but they also get a joint annuity when their husband dies). The annuities are provided by private companies in a competitive market. Since 2008, retirees who choose gradual

withdrawal have been required to set aside a special reserve fund to draw upon when their account is exhausted, to mitigate moral hazard. Two-thirds of all current pensioners have annuitized and receive the Chilean risk-free interest rate, which has been much higher than the rate of wage growth (James, Martinez and Iglesias 2006). Poland has also recently mandated annuities in its FDC plan, to be provided privately. Some other countries in Eastern and Central Europe have not yet made a decision on this issue.

In contrast, there is much greater uniformity among NDC systems and less choice to workers on payout mode—all systems require annuitization, the annuities are provided by a public agency, based on unisex mortality tables and must be individual (except for Egypt, which plans to allow joint annuities or even to require them if the spouse has no own-pension). NDC systems are much like PAYG DB systems in these regards. Having no funds in their accounts, workers may have less sense of private ownership in NDC than FDC—and therefore less expectation that they will have some choice of payout mode. Central provision is necessary unless the public agency is prepared to pre-fund the lifetime pension at the point when the individual retires—but this would run counter to the PAYG ethos of NDC.

The imputed interest rate used in the conversion of notional accumulation to annuity is low—0 in the case of Poland and Latvia, real 1.6% for Sweden and .75% in Norway. This is lower than the prevailing rate in Chile over the past three decades and lower than the “risk-free” (treasury) rate in most countries. It is, of course, the rate chosen by a mandatory public monopoly, not by a competitive market, and is consistent with the low notional return during the accumulation stage as well as the sustainable PAYG rate. The low interest rate produces a low initial payout and is one of the reasons why many individuals may conclude that these systems are not actuarially fair to them personally.

### **Unisex tables?**

One of the most contentious issues in a DC social security system is: which individual characteristics should be taken into account in selecting the appropriate mortality table for converting the individual’s retirement accumulation into his or her annuity? The most salient characteristic in this regard is gender, because the life expectancy of women is generally about 3 years greater than that of men.

In DB schemes, community rating is implicitly used. That is, the same formula applies to all individuals regardless of gender, health or other characteristics. In a DC regime, explicit rules

are needed. The basic idea is that the expected present value (EPV) of lifetime payouts approximately equals the retirement balance in the DC account (see Brown et al 2001, James and Vittas 2001, James, Martinez and Iglesias 2006). The question is--which mortality tables go into the EPV calculation? In an FDC scheme, if unconstrained competitive insurance companies provide the annuities, they may take into account many factors, such as health status, parental history and race, to put people into different mortality risk categories that yield different monthly payouts from a given premium. Should they be allowed to put men and women into different categories—that is, to use gender-specific mortality tables in calculating expected lifetimes--or should regulations require unisex tables?

If gender-specific mortality tables are used, women's monthly pensions will be smaller than those of men with similar retirement accumulations, to compensate for their longer expected period of payment. In contrast, unisex tables assume a common (average) survival probability for men and women. Since both genders are treated as if they have the same expected lifetimes, the monthly pensions of women are raised and those of men lowered, relative to gender-specific tables. This implies a redistribution of income to women, who get back more over their lifetimes than they paid for, and vice versa for men. As discussed below, this redistribution is particularly large if wage indexation is used, back-loading the annuity payouts. Besides the redistributive effects, the higher return on women's contributions may lead women to work longer than they would have otherwise and vice versa for men--if they correctly calculate these pay-offs.

The chief argument in favor of the unisex requirement is that it tends to equalize the monthly benefits, therefore the standard of living of men and women. Those in favor also point out that the life expectancy distributions of men and women are wide and overlapping so it is unfair to attribute a higher average lifetime to all women, thereby penalizing them because of an average characteristic of their gender.

The chief arguments against the unisex requirement are that it implies a lifetime redistribution from men to women that may not be equitable; in some cases it redistributes from low-income men to high-income women. It poses implementation problems in FDC systems, including adverse selection by individuals and cream skimming by insurance companies. If annuities are not required, men may avoid them because under unisex they will get poor terms—this is a form of adverse selection. Then, the market may end up dominated by the risky group—females—and their higher longevity rates. In the opposite direction, insurance companies will

seek to “cream skim”-- attracting men, who are lower risk and therefore more profitable, and avoiding female annuitants who will live longer. For these reasons, probably unisex should not be imposed unless annuitization is mandatory and exclusion is prohibited. Even if not legally permitted to exclude women, companies may concentrate their marketing or offer better rates in occupations and industries where men dominate. In competitive markets, companies that end up with a disproportionate number of women will make a loss and may become insolvent. To counter these effects, a risk adjustment mechanism may be desirable in countries that require unisex; but risk adjustment mechanisms are themselves difficult to implement.<sup>5</sup>

These implementation arguments are not relevant in NDC systems where annuitization is mandatory and provided centrally, but the equity arguments pro and con remain. Equity, of course, is in the eye of the beholder; there is no objective right and wrong. In evaluating this issue, it may be relevant that the changes in monthly income and lifetime redistribution due to unisex tables are surprisingly small—only 2-3 percent--in the context of joint annuities purchased by married couples. The reason is that the mortality rates of both spouses enter into the determination of payouts in joint annuities, whether or not unisex tables are used. But joint annuities are not permitted in current NDC plans. The effect of unisex is more noticeable—7-8 percent--for individual annuities (see Table 2 and Edwards and Wong 2008). And it is still larger in the low-interest rate context of NDC, where distant years are given heavier weights in annuity calculations. Nevertheless, even in the latter case, unisex tables have a much smaller impact on women’s living standards than joint annuities would have, or equal retirement ages in countries where they are now unequal. And they have a less beneficial impact on poverty than the redistributive safety net, since most women who benefit are not poor while some men who implicitly pay by getting lower pensions are poor. In this sense, the benefits (and costs) of unisex may be overstated.

What have countries done? All NDC countries require unisex, and European countries are also moving toward unisex in their FDC plans, but with a bit more debate. Poland recently made this decision, adding a risk adjustment mechanism. More generally, in the EU, community mortality tables are required when accounts in the mandatory FDC or NDC pillar are annuitized. (This also means that healthy and sick individuals, rich and poor people, are treated as if they have the same life expectancies, even though we know this isn’t true. The lifetime redistribution from poor to rich in DC plans offsets some of the opposite redistribution in the safety net).

At the opposite end, most Latin American countries allow the use of gender-specific tables and other risk categorization by insurance companies issuing annuities for their FDC plans (see James, Martinez and Iglesias 2006). The U.S. does not have a mandatory DC plan but does have voluntary employment-based DB and DC plans. Employment-based DB plans and DC plans that annuitize are legally required to pay equal monthly benefits to men and women, implying unisex tables, and a joint benefit is also required unless the spouse specifically waives that right. However, DC accumulations are typically paid out in a lump sum or rolled over into retirement accounts that are not under the employer's control. If the worker later decides to annuitize, this takes place outside the employment relationship and gender-specific tables may be used. The rules might be quite different if these or similar accounts became part of the mandatory system.

### **Indexation rules and their interaction with unisex tables**

Future price changes and wage growth are uncertain. Who bears this risk in a pension system? Indexation policy deals with this issue. Pensions can be nominal, indexed to prices or indexed to wage growth. The indexation method chosen plays a key role in determining the distribution of retirement resources between young-old vs. old-old and men vs. women.

In the past, in traditional PAYG DB systems, many countries simply promised nominal benefits—the dollar amount was unchanged regardless of what happened to prices or wages in the broader economy. In an inflationary context, this meant that the purchasing power of the benefit gradually declined. It left retirees exposed to the risk that their pensions would eventually become worthless. This lack of indexation particularly hurt women, because of their greater longevity. Their lifetime real pension was much less than it appeared initially.

Currently, many countries index the DB to inflation, so the real value remains constant as prices rise. The system's treasury bears the inflation risk. However, if wages are growing, the purchasing power of pensioners will decline relative to that of workers over the retirement period—which is part of the reason why very old women are often relatively poor. Wage indexation maintains the relative position of workers and pensioners. This is especially valuable to retirees with long expected lifetimes, predominantly women. But it costs much more than price indexation and could result in transfers to older generations and/or fiscal non-sustainability in PAYG DB systems. Given this trade-off, some countries use a mix of wage and price indexation; the 50% mix in Switzerland is best known.

In decentralized FDC plans, options are more limited since costs cannot be passed on to future generations. Instead, if risk classification is unconstrained in the annuity market, the expected present value of each individual's lifetime annuity stream is set to equal his or her retirement accumulation (assuming a money's worth ratio close to 100%, consistent with empirical analyses; see James and Vittas 2001; Brown et al. 2001). Subject to this constraint, annuities can be specified in nominal terms or price-indexed. The latter is more costly to insurance companies because they are bearing the inflation risk. They pass this cost on to retirees in the form of a risk premium that reduces the rate of return, which in turn depresses the payout stream. In Chile all annuities are price-indexed yet companies base their pricing on a relatively high rate of return, because many price-indexed financial instruments are available for insurance company investments and hedging (James, Martinez and Iglesias 2006). But these are unavailable in most low and middle-income countries (and even in some high-income countries). In view of these considerations, Poland has not yet decided how to index its FDC annuity and is considering tying it to investment return. Wage-indexed annuities are practically impossible for private insurance companies to provide in FDC plans because risk is high and hedging instruments are unavailable.

In principle, NDC plans with centralized annuity provisions have a wider range of options. Since there are no assets to invest, and private insurance companies are not involved, the absence of hedging instruments is not an impediment to wage indexation. They can choose to index annuities to wage growth or price growth or simply leave them unchanged in nominal terms. These choices determine the time stream of payouts over the individual's lifetime, the types of redistributions that occur within a given cohort and the likelihood of spillover costs across cohorts. The indexation practices observed are consistent with this wide latitude for choice, albeit closest to price indexation. Latvia indexes to price, although this has temporarily been frozen and pensions have even been cut. Egypt plans to use price indexation. Italy indexes to price, but only to 75% of price for high earners. Poland is a bit more generous—80% to price but 20% to average earnings, which generally grow faster than prices. Sweden's indexation is more complicated: An expected rate of real wage growth ( $w$ ) of 1.6% is used as the imputed interest rate in its initial pension calculation. In subsequent years payouts are indexed by nominal wage growth minus 1.6%. If realized real wage growth turns out to be 1.6%, this results in price indexation ( $p + w - 1.6 = p$ ). If actual wage growth  $< 1.6\%$ , indexation is less than full

price, and vice versa if wage growth  $> 1.6\%$ .<sup>6</sup> Norway is more likely to raise real pensions over the retirement period, since it indexes to nominal wage growth minus  $.75\%$  (while the initial payout is based on expected real wage growth of  $1.5-.75\%$ ). The higher expected future payouts imply a lower payout initially, to stay within the constraint set by the individual's notional accumulation.

Basically, NDC systems that strive to be actuarially fair and to pool mortality risk within a given cohort face a trade-off between size of the initial versus future pensions, as determined by the imputed interest rate and the indexation method. Suppose that the system's hypothetical rate of return is the growth in wage rate or wage bill and gender-specific mortality tables are used in the annuity calculation, which implies risk-pooling separately for each gender. Then, holding the total expected present value (EPV) constant at the notional accumulation, the choice of indexation method does not produce gains or losses for a given individual or gender-cohort group. It simply changes the time stream of ex ante benefits for the individual and the distribution of ex post benefits within each group. To stay within the constant EPV, full wage indexation requires a lower initial pension than price indexation, and price indexation requires a lower initial pension than no indexation alone. Wage indexation pushes more of the individual's benefits into the distant future (Figure 1). Those who live longer than expected gain ex post, while those who die unexpectedly young lose.<sup>7</sup>

However, if unisex mortality tables are used, this implies risk-pooling across both genders. Then, a movement toward wage indexation implies an increase in the EPV of total benefits for the entire group of women in each cohort--that is, a redistribution from men to women takes place--because women are the ones who will disproportionately survive to collect the larger benefits at the end. Thus, women (and healthy people and high income groups, who live longer) would have gained if Sweden had chosen a lower imputed interest rate in its annuity calculations, implying a smaller initial pension and a larger adjustment for actual wage growth subsequently. This would have increased the rate of return to women's contributions and would potentially have generated a positive incentive for them to work longer (and vice versa for men).

### **III. Safety Nets** (Table 1, rows 10-17)

NDC plans tie benefits closely to contributions so they leave non-contributors and low contributors with little or no pension in old age. From one point of view, this may not be a problem—women who managed without wages when young may be able to manage without pensions when old, having some other source of income. From another vantage point, however, it may be a big problem. Some women did not work when young because they were caring for children and their husbands supported them; but their husbands may be dead or divorced so they no longer have this alternative means of support. Some people who haven't accumulated pension rights worked informally when young. When they grow old they are no longer able to do so. Some low earners who barely subsisted on their wages when young will live in poverty if they don't have a similar amount when old; but their pensions may be much less because of their small contributions and the low rate of return in the NDC.

Several policy options exist for solving this problem. For example, the extended family may continue to support the wife and mother. Maternity and caring credits can be given for women who stay at home to perform non-market functions that society values. Survivors' benefits can be paid to those who depended on their spouses; or the spouse can be required to purchase a joint annuity (see discussion below). The family's retirement accumulation can be split continuously or upon divorce. Nevertheless, very old women who didn't work regularly are a common poverty group. Many countries have chosen to use safety nets for non-contributors and low contributors to avoid this outcome.

In DB countries, the safety net is sometimes implicitly embedded in the DB formula. For example, the accrual rate may be higher for the first 10 years, or for the first tranche of income. But in DC countries, the safety net arrangement must be explicit and separate from the DC pillar, which is itself largely non-redistributive. What kinds of safety net arrangements have been and should be chosen by NDC countries? Men and women are affected very differently depending on whether the benefit is flat or phased out against other income, or simply a minimum pension guarantee, whether it is for all residents or only for contributors, and if the latter, how many years of contributions are required for eligibility.<sup>8</sup>

### **Universal flat benefit**

To keep the elderly out of poverty, some countries offer a flat (uniform) pension to all residents, once they pass an age threshold such as 65. The Netherlands and New Zealand are the best known examples. Norway and Sweden also had this prior to their NDC reforms. These

arrangements set an income floor for each elderly person, regardless of whether or not they have contributed. Usually they are financed from the government's general budget. They are redistributive because all elderly residents receive the same amount even if they had no market earnings, but those with high incomes pay more to finance it. In low- and middle-income countries with more limited fiscal capacities (Botswana, Nepal, South Africa) the flat benefit is smaller and usually starts at a very old age such as 70 (Palacios and Sluchynsky 2006). This is the plan for Egypt, when it starts its projected NDC plan.

Women are major gainers from such universal uniform pensions, particularly older cohorts of women who did little or no market work. They get the same monthly pension as men, but since they live longer, they get a larger EPV of lifetime gross benefits. And their low income implies a small tax payment toward financing the cost. So as a group they get an income redistribution from men. These arrangements may discourage market work by women to some extent, because they provide additional lifetime income and pension wealth, hence allow women to allocate more time to household work or leisure. However, the work disincentive or implicit tax cost due to the phase-out for high earners is absent. For any given pension floor, this is the most costly but least distortionary way to achieve it. Currently, no NDC country uses it.

### **Phased-out flat benefits, minimum pensions and the implicit tax on labor**

In an effort to cut costs, most countries phase out the non-contributory flat benefit as contributory pensions and other income grow. The phased-out flat benefit is even more redistributive from high to low earners than the pure flat, because the former get little or no benefit while paying most of the tax cost. It sets a floor for those who have no other retirement income. If their contributory pension grows their total pension also grows, but this growth is partially offset by the decline in their flat benefit.

The phased-out flat is fiscally attractive, but poses an efficiency cost: it is much more distortionary than the pure flat benefit, because the phase-out rate becomes an implicit tax on work. This phase-out rate varies widely across countries, from 15% to 50%. Some portion of the benefit is usually received by 25-75% of the population and the implicit tax deters formal work by that same group. By now it has been well established that workers respond to implicit taxes in the old age security system, especially when making decisions about when to start the pension and stop work (Gruber and Wise 1999 and 2004, Disney and Smith 2002, Song and Manchester 2007, Edwards and James 2008). Women are disproportionate recipients of phased-out flat

benefits and the implicit tax that it generates. This is the most common type of safety net in NDC countries.

For example, when Sweden introduced its NDC plan in 1999, for fiscal reasons it converted its pure flat benefit to a benefit that phases out at a 100% rate for the first tranche and 48% subsequently. The switch from pure flat to phased-out flat reduced lifetime benefits to the large group of women who divided their adult lives between market and home work. Previously they got the entire flat benefit as a large proportionate addition to their own-pension while now their flat benefit has been partially phased out (Stahlberg et al 2004). Currently almost half of all pensioners (68% of females and 18% of males) receive some top-up from the treasury. The Swedish pension authorities estimate that in the future, average earners will have to work at least 20-24 years with 1.8% real wage growth to exceed the phase-out range (Orange Report 2008). Thus, a high proportion of women (who work less than 24 full-time years) will continue to receive some part of the safety net benefit, will be subject to its high implicit tax and will be largely immune to the work incentives posed by the NDC.

Norway previously had a small pure flat benefit for everyone combined with a phased-out flat above that level. Its new NDC system will simply include a modified flat that phases out at an 80% rate throughout. Initially the benefit for non-contributors will equal 33% of the average wage, and the phase-out range will continue until contributory pensions equal 70% of the average wage. Most recipients are projected to be women and more than half of Norway's female pensioners fall within the phase-out range, are subject to an 80% implicit tax on labor and are therefore insulated from NDC incentives ([www.nav.no/212375.cms](http://www.nav.no/212375.cms)). (But Norway is considering an actuarial adjustment of the benefit after age 67 to offset this disincentive).

In some countries the phase-out rate is 100%--this is a pure minimum pension guarantee (MPG). That is, all seniors are guaranteed a minimum income, their contributory pension crowds out the public top-up dollar for dollar, and retained income does not rise above the minimum level until the public benefit is fully displaced. This is the case in Poland. This 100% implicit tax will strongly cut the incentive for marginal work in the formal market for individuals whose potential contributory pension is less than or close to the minimum.

The MPG level is usually in the vicinity of the relative poverty line, much lower than the maximum pension at which some top-up is received in systems with phased-out flat benefits (see endnote 8). For example, in Chile the MPG was received only by individuals whose

contributory pensions were less than 25% of the average wage, while some part of the phased-out flat benefit that replaced it in 2008 is paid up to 66% of the average wage. Many retirees have pensions that lie between 25% and 66% of the average wage. Consequently, although the work disincentive facing each recipient in MPG systems is greater than that associated with phased-out flat benefits, far fewer people are in that group of recipients. Once persons get past the guaranteed floor they are also past the implicit tax.

In most countries the couple's rate for the phased-out flat or minimum pension is less than double the individual's—in recognition of joint consumption and household economies of scale. (We return to this point below when we discuss survivors' benefits). Usually the phase-out takes into account all household income, although in some cases only the individuals' wage or pension income counts. In Sweden and Norway only the NDC pension counts against the phase-out but in Poland the sum of the NDC + FDC count. Assets are rarely considered (although in Australia they are). Thus, to a large extent this is a tax on income from past or present labor.

Safety net recipients are granted higher income and pension wealth than they would have otherwise—which is their purpose. However, they (and their younger worker counterparts anticipating this situation) have a greater incentive to choose leisure over labor due to the income and wealth effects, the explicit tax cost of financing the non-contributory benefit, the contribution rate to their own pension (typically 15-20% in NDC countries) and the high implicit tax cost from the MPG or phased-out flat. These implicit and explicit taxes comprise a big subtraction from actuarial fairness and a deterrent to continued formal market work.

Women are disproportionate recipients of the phased-out flat or minimum pension guarantee and also disproportionately subject to the disincentives for market work. As they approach retirement and make these calculations, women who think they will fall in or near the minimum pension or phase-out range will be discouraged from continuing to work and contribute. This will reinforce their inferior position when they become old and widowed. Although the NDC is supposed to incentivize work, this incentive fails to reach about half its women, who expect to receive the safety net benefit.

### **Contributory requirements for flat and minimum pensions**

To reduce fiscal costs and to encourage formal market work, countries sometimes provide these safety net benefits only to contributors, not to all residents. The contribution requirement is supposed to offset the implicit tax and incentivize work. The careful setting of

contributory requirements then becomes crucial. If set “too high” many individuals will fail to qualify and may end up below the poverty line, but if set “too low” the fiscal cost may be great.

Women’s pensions are especially sensitive to these eligibility conditions. For example, relatively few women meet the 30-year contribution requirement for Argentina’s flat benefit or the 25-year requirement for Mexico’s MPG, so most contributions by women are a pure tax. And those who have contributed long enough to become eligible probably have own-pensions that exceed the pension floor.<sup>9</sup> In response to low coverage rates, Argentina changed its system to include a minimum pension with little or no contribution requirements and Mexico is considering a non-contributory flat benefit. Among NDC countries, Poland requires 25 years of work for men and 20 years for women, which is probably not unrealistic in view of the high labor force participation rate of women in that region.

Facing the tension between the coverage and redistributive advantages of a residence-based system versus the cost and work-incentive advantages of contribution requirements, some countries (e.g. Belgium, France, Ireland, Luxembourg, Portugal, Switzerland, the Czech Republic, Turkey) have set up a two-tier minimum pension—a poverty-level floor for all senior residents and a higher minimum for contributors (see Whitehouse 1997). Among NDC countries, Latvia has a three-tiered minimum pension, depending on whether the individual has 20, 30 or more than 30 years of service. Italy resolved this tension in another way when it adopted its NDC plan—by abolishing the minimum pension altogether and replacing it with a small means-tested social assistance benefit for the elderly. This may be the best course in countries where residents have large unofficial sources of income.

### **Indexation of the safety net**

Indexation of the non-contributory pension plays an important role in determining the welfare of women, just as it did in connection with the contributory pension. If the flat benefit or MPG is not indexed at all, it is quickly devalued in real as well as relative terms, over the lifetime of a retiree and for later cohorts. A price-indexed non-contributory benefit maintains its absolute real value, but falls over the lifetime of retirees and for successive retiring cohorts, relative to wages of workers. Over time, fewer retirees collect the benefit. If the object is to avoid absolute poverty, price indexation does the job. But if poverty is defined in relative terms (income of pensioners relative to workers), wage indexation of the safety net is needed. Wage

indexation, however, costs much more than price indexation. If wage growth is 2% per year, after 36 years a wage-indexed pension is double a price-indexed pension.

Since NDC systems were adopted at a time of fiscal pressure, it is not surprising that price indexation is most common. For example, in Sweden the income floor, which was rather generous to begin with, was price-indexed in the new system as a politically acceptable way to gradually reduce old age expenditures relative to tax revenues, which rise with wages. Eventually fewer individuals will receive the non-contributory benefit, as NDC pensions (that are linked to wages) grow faster than the price-indexed minimum. This cuts costs as well as the scope for implicit taxes and work disincentives. It also leads to greater inequality, with the disparity increasing between the incomes of workers versus pensioners, top versus bottom quintiles of retirees, and men versus women. For this reason, some analysts expect that a linkage of the non-contributory benefit to wages will eventually be resumed. In Norway, the income floor is scheduled to rise with wage growth minus a .5% adjustment factor for increased life expectancy. Since contributory pensions rise with wages, the proportion of women immune to NDC incentives will gradually fall, but more slowly than in Sweden. Norway can afford this costlier scheme, in part, because of its oil revenues. Poland's MPG indexation is in-between that of Sweden and Norway—it rises 80% with prices, 20% with wages. Since recipients of non-contributory benefits are disproportionately women, the decision about how to index these benefits largely shapes the retirement income of very old women and future cohorts of women.

### **Should credits for child care be offered?**

Most European countries grant pension credits for time spent in maternity and child care, and NDC countries are no exception. The presumption is that rearing children is a socially valuable function, and those who do it shouldn't be penalized by loss of pension rights. Perhaps an underlying belief is that having children should be encouraged, in a region where fertility is below replacement rates. Increasingly, the credits can be used either by husband or wife. The child care credits vary from 1-6 years per child. But they have been reduced in some transition economies because of fiscal pressures and falling work propensities of women.

In DB countries, these benefits are usually financed on a pay-as-you-go basis. In most NDC countries the public treasury actually shifts money to the pension fund at the moment that the obligation is incurred. (In Norway there is no distinction between the pension fund and the treasury). In principle, this requirement that all obligations be financed *ex ante* imposes fiscal

discipline and prevents governments from shifting costs to future generations for benefits that will be received by current generations.

Child care credits, like the safety net, are a fiscal obligation, but they have quite different effects on work incentives. Usually they go only, or in larger amounts, to women who have reduced incomes during periods of child-bearing and rearing; to that extent, they discourage work during those periods. (For example, in Italy they go only to women who take child care leave; in Sweden they fill in the gap for women whose incomes have fallen due to child care, and if income doesn't drop the pension credit is very small). So they discourage women with young children from working. However, the fact that they add to the notional accumulation means they may increase work later on for many women, as they make it less likely that women will become recipients of the minimum pension and subject to its implicit tax.

### **The basic trade-off: poverty-avoidance vs. work incentives**

The NDC pillar is designed to reward work. The safety net is designed to avoid poverty by redistributing to those who have low pensions because they have not worked or have worked at low wage rates—a direct conflict to the degree that the decision to work is volitional.

A universal flat benefit is most inclusive and neutral on work incentives but also the most costly option. Phasing out the flat benefit as the contributory pension grows further targets it toward women and other low-earners and economizes on fiscal resources, but the implicit tax it imposes may discourage them from engaging in formal market work—which would help get them out of the low-income trap. A flat benefit with a high contributory requirement for eligibility is cheaper yet but excludes most women (as well as many men who have worked informally) and turns any contributions they have made into a pure tax.

In the past, strong social norms kept most women out of the labor market, so these incentives may not have mattered, but today's norms give women greater discretion about how much to participate. The safety net structure that increases the welfare of older women today, taking their past behavior as given (for example, a universal flat benefit with a phase-out) may discourage market work and slow down behavioral change that will improve the welfare of younger women in the future. NDC countries are still grappling with this trade-off and each country has chosen a different course. Perhaps the basic ingredients should be: a modest flat pension for all senior residents, starting or increasing in size at a rather late age, when other resources are most likely to be used up. If a phase-out is applied for fiscal reasons, the implicit

tax should be applied against all income sources in the household, to keep it low. If a contributory requirement is imposed, it should be low enough to include most women. If poverty problems are concentrated in the very old, then arrangements that push income to very old age, such as partial wage indexation and joint pensions for survivors, are important. For individuals who are in the phase-out or minimum pension range, it should be recognized that incentives from the NDC are largely irrelevant. These are mainly women.

#### **IV. Survivors' Benefits and Joint Pensions (Table 1, rows 20-24)**

Old age security schemes are designed, in large part, to smooth consumption over the life cycle. Since women are usually younger than their husbands and have longer life expectancies, they are likely to outlive their husbands. Besides the young-old life stage, most women have an additional life stage that most men do not have—they eventually become widows, who often live alone, and this stage may last for many years. Therefore, a program that is designed to smooth consumption over the life cycle must include widowhood as one of the most vulnerable stages of life. (The term “widowhood” here applies to formal marriage as well as non-married cohabiting couples and civil partnerships, and the term “husband” applies to the male partner in all these cases).

##### **The economic rationale for survivors' benefits**

Since husbands have traditionally provided the bulk of the family income, some arrangements for survivors' benefits are crucial to wives' financial welfare. In the past, many wives did not work in the market place so this financial dependence was extreme. At present, most women work for some part of their adult lives, but they are likely to earn less and accrue smaller pension rights than their husbands, because they take time out for child-bearing and rearing, may work part time, and at jobs that pay a smaller wage rate. While they have some independent financial capacity, when the husband dies the family income is cut by more than 50%.

Even if women earned as much as men, they would suffer a sharp decline in standard of living upon the husband's death, because of joint consumption and household economies of scale. Owing to scale economies, household costs for given living standard will typically fall by only 30% when they cover a single person rather than a couple.<sup>10</sup> Yet, in the absence of

survivors' insurance, household income falls by 60-70% when the husband dies. The husband's death may come too late in life for the widow to recoup by embarking on a full-time highly paid career. It is not surprising that very old widows are one of the poorest groups in many countries (Smeeding and Sandstrom 2004).

In principle, this problem could be solved through voluntary saving or the voluntary purchase of life insurance. However, if households are myopic, or if the husband places greater weight on consumption during the period when he will be alive, the household will not save or insure a sufficient amount voluntarily (Bernheim et al 2003, Friedberg and Webb 2006). High payroll taxes for mandatory old age benefits in many countries make voluntary insurance purchases or long term saving a low priority. Evidence from the UK suggests that, where the choice is voluntary, the vast majority of men use their retirement funds to purchase single life annuities rather than joint annuities (UK Pensions Commission 2005).

In traditional DB programs, generous survivor benefits were often provided—but at the same time they introduced serious problems of their own, such as work disincentives for women, non-transparent redistributions from single individuals to married couples and cross-subsidies from dual career to single-wage earner families. These criticisms, combined with serious fiscal pressures, have led to major cuts in these programs, particularly in Eastern and Central Europe. At the same time, new FDC systems in Latin America have developed ways of providing survivors' benefits that smooth consumption for widows without the deleterious side-effects just described, by requiring husbands, upon retirement, to purchase joint pensions that cover their widows. Rather than incorporating survivors' benefits into the NDC pillar, NDC countries have continued to cover widows as a separate PAYG-funded defined benefit, with the negative consequences listed above, or they have simply eliminated these benefits, exposing widows to a sharp drop in standard of living. It might be more consistent with the NDC philosophy to protect women in their final life state through a joint annuity option.

### **Survivors' benefits in DB systems**

Traditionally, in public DB plans, older widows received 50-80 percent of the primary benefit, starting at the point when the husband died. These rules still prevail in some European countries (Italy, Luxembourg, Austria) as well as parts of Asia and the Middle East. This was financed by the common social security pool—a costly benefit. Rules regarding eligibility in these systems typically reinforce traditional social roles. In almost all public earnings-related

DB plans survivors' benefits are considered a payment to widows who were dependent on their husbands. If they worked and have their own pension they must give up all or most of it to get the widow's benefit. Since the husband's pension is usually much larger, they tend to take the widow's benefit--this increases their income. But it also means that any contributions made by working wives are a pure tax; they get no incremental benefit in return (James 2009a).<sup>11</sup>

Some countries (e.g. Belgium, France and Germany) phase out the benefit against wages as well. In Estonia, widows must choose between their own-pension and the survivor's pension, which is also phased out against wages. The U.S. system pays an additional 50% of the husband's pension to wives while the husband is still alive and 100% to widows after his death—but these benefits are fully offset against own-pension and also reduced by wages (prior to the normal retirement age). In all these cases, survivors can receive investment income or inherit money without losing their benefit—only labor income is penalized. Recent studies have found that, in the United States, married women reacted to these incentives by working less than single women and retiring early (Munnell and Jivan 2005, Munnell and Soto 2005).

These rules also create perverse redistributions. The largest net benefits (gross benefits received minus payroll taxes paid) go to married women who never worked outside the home. These wives often get larger pensions than single women who worked. Part of the contribution of single people, who don't qualify for these benefits, goes to subsidize married couples. Dual career families, where the wife may take her own benefit instead of the widow's benefit, subsidize traditional families with a sole breadwinner, and low-earning couples subsidize high-earning couples, whose wives receive larger benefits. The survivor's benefit, in effect, forces working wives to contribute toward the pension of non-working wives, thereby discouraging women's work. For a wife who has worked part of her adult life, the fact that she can't keep her own pension as well as the survivor's benefit ignores household economies of scale and make it almost inevitable that her standard of living will fall when her husband dies.

As women's labor force participation rates have risen and fertility has fallen, fiscal pressures have led to cutbacks in these survivor benefits, especially for young widows without children, who are now expected to work. For example, in most Eastern and Central European countries, the U.S. and U.K., widows do not receive benefits until they are close to retirement age, unless they are caring for dependent children. In Lithuania and Australia new widows get virtually no survivor's benefit, regardless of age (they are eligible for the contributory and non-

contributory old age benefits paid in these countries). In Western European countries that pay flat benefits to most elderly residents (as just discussed), special benefits to older widows are now considered to be unnecessary.

### **Joint annuities in FDC systems**

Survivors' benefits are handled quite differently in the new FDC pillars in Latin America, and this suggests design features that could be built into NDC pillars as well. In Latin America, upon retirement, each spouse is required to purchase a joint annuity or other joint pension that covers the widow as well as the primary beneficiary. This reduces the husband's pension by 15-20%, depending on share of primary benefit that survivor gets and relative ages of husband and wife (see Table 2, rows 1 and 2 versus 3 and 4; James, Edwards and Wong 2008; Orange Report 2008). The theory behind this mandate is that wives have lower earnings and pensions because of the implicit contract they made with their husbands to allocate time toward household and child-care services, in exchange for monetary income that he will provide. The joint pension requirement enforces the wife's entitlement after his death and prevents families from externalizing the cost of household services. The widow is protected, but the husband (rather than singles and dual career families) pays. Therefore it avoids inequitable redistributions and distortionary choices about marriage and work.<sup>12</sup>

Most important, widows are allowed to keep the benefit from the joint annuity as well as their own benefit. Since the husband has paid for the joint annuity by taking a lower payout himself, this becomes his wife's property upon his death and there is no reason for her to pay twice, by foregoing her own pension. This ends the high taxation of married women who work in the market and enhances the incentive for them to work. Recent research indicates a strong positive response in the labor force participation rates of older married women (Edwards and James 2010).

In Chile, the joint annuity comprises over 60% of the total monthly pension of the average widow and raises the EPV of total lifetime benefits for the average woman by over 40%. The widow's benefit plus her own benefit maintain household purchasing power at about 70% of the previous level, so her standard of living is roughly unchanged (Table 2). The joint annuity requirement also extends system coverage to many women who have not worked in the formal market--without placing a burden on the public treasury or an implicit tax on working women. In countries that are considering unisex requirements, joint annuities reduce its cost and

distortionary effects. Since widowers are treated symmetrically with widows in most countries, the joint annuity requirement also protects long-lived men. In effect, it provides family co-insurance against the financial loss of a key earner. It pushes some retirement resources toward the very old age of the last surviving spouse.

Despite these advantages, the joint annuity is not mandated in most FDC systems in Eastern and Central Europe, Sweden and Australia. In Sweden's FDC system joint annuities are permitted but not required. Contribution-splitting is also permitted while both partners are alive, but this does not shift the wife's retirement income to the widowhood stage.

### **NDC policies toward survivors and joint annuities**

In all NDC systems (except for the projected plan in Egypt), joint annuities are not required or even allowed (nor is contribution-splitting permitted while both partners are alive). This represents a decision that the surplus from the notional accounts of men who die young should be returned to the common pool, spent as an enhancement to the return of everyone in the system, rather than in maintaining the living standard of their wives. Instead, survivors' pensions are provided in Poland, Italy and Norway as a separate PAYG defined benefit, with all the inherent problems described above; in other countries they have simply been eliminated. In Poland, widows receive a survivor's benefit at age 50 that is 85% of their husband's pension, but this is partially offset against wages if they work and entirely forgone at 60 if their own (NDC+FDC) pension is larger. In other NDC countries, the separate widow's benefit has been dropped completely. In Sweden, survivor's benefits are paid to young widows with children on a temporary basis; they are not paid to older widows. In Latvia, survivor's benefits are paid to children but not to widows. Smoothing consumption over the life stage of widowhood is disappearing as an NDC objective. This may be one reason for the growth in term annuity purchases for women in Sweden; but such purchases are unlikely to be large enough to fill in the gap (Palmer 2008).

This attitude toward survivors is inconsistent with provisions in flat and minimum pension safety nets in these same countries, which give couples less than double the individual rate. Such provisions stem from a recognition of household economies of scale; yet the absence of joint annuities in NDC plans ignores this phenomenon. It is also inconsistent with the NDC ethos of work incentives and fiscal responsibility. In countries that still have a separate survivor's benefit that is phased out against own-pension, work by women is discouraged. In

countries that have eliminated survivors' benefits, widows may be eligible for a larger non-contributory benefit owing to their lower income. This imposes a fiscal burden on the public treasury while at the same time leaving widows who are just above the threshold experiencing a fall in living standard. Making joint pensions mandatory in NDC systems and allowing widow(ers) to keep their own annuity as well as the joint annuity would maintain their living standards, remove a disincentive for formal labor market work and co-insure both partners, without increasing the fiscal burden. This would be more consistent with the NDC philosophy.

## **V. Conclusion**

What is the gender impact of NDC plans? Except for the earlier retirement age permitted for women in Poland, practically no gender-specific provisions remain in NDC countries. However, many provisions still have subtly different impacts on men and women. On the one hand, compulsory annuitization together with the required use of unisex tables in the NDC pillar and minimum pensions or phased-out flats in the safety net pillar have implicit or explicit distributional effects that favor women. On the other hand, the likely absence of an increase in real NDC pensions over the retirement period, the move toward price indexation of the safety net benefit, the shift from pure to phased-out flat pensions (in Sweden and Norway) and cutbacks in survivors' benefits without a replacement in the form of joint annuities will have negative consequences for women. Most of these same issues arise in NDC and FDC pillars, but with different policy outcomes regarding annuitization, use of unisex tables and indexation.

Two effects are worth particular attention: the remnants of work disincentives for women and the likely deteriorating position of very old women in some NDC countries. While the NDC pillar was designed to encourage work, disincentives remain through the earlier legal retirement age for women (in Poland), the high implicit tax in systems with non-contributory minimum pensions or phased-out flat benefits, and arrangements that force widows to choose between their own contributory pensions and survivor's pensions. The deteriorating position of very old women is a consequence of their earlier retirement in the face of a longer life expectancy, a time stream of real benefits in the NDC pillar that is likely to remain stable (or even to fall) rather than rising over the retirement period, little or no wage linkage in most safety nets, and cuts in survivor's benefits. As a result, the growing numbers of very old women are likely to find

themselves at the bottom of the income ladder. This will particularly affect those with relatively little education and labor force attachment, who respond to the work disincentives when young-old and find themselves in trouble when they are old-old. These disincentives could be removed and very old women better protected, without imposing a cost on others, by:

- Equalizing retirement ages for men and women in countries where this has not yet been done, and gradually raising the normal pension age for both genders;
- Shifting some retirement resources to very old age by using a low imputed interest rate in initial NDC payout calculations and allowing benefits to rise if actual wage growth is higher;
- Reconfiguring safety net arrangements so their implicit tax affects a small group and their benefits rise with age (e.g. through a pure flat benefit or a minimum pension that starts low and rises for the very old, whose private resources are likely to be used up);
- Requiring each spouse to provide, from his or her NDC accumulation, a joint pension that covers the widow(er), as an add-on to the widow's own contributory pension.

**Table 1: Gender-Related Characteristics of NDC Plans**

	Sweden	Poland	Latvia	Italy	Norway	Egypt
<b>Retirement age in NDC pillar</b>						
1. Legal retirement age	65M&W	65M/60W	62M&W	65M&W	67M&W	60M&W
2. Early age reduces pension size	yes	yes	yes	yes	yes	yes
<b>Payouts from NDC pillar</b>						
3. Annuity required?	yes	yes	yes	yes	yes	yes
4. Public provision?	yes	yes	yes	yes	yes	yes
5. Actuarially fair? <sup>3</sup>	yes	yes	yes	yes	yes	yes
6. Payout dep. on life exp & retiremt age?	yes	yes	yes	yes	yes	yes
7. Indexation method?	Nominal w - 1.6% <sup>4</sup>	80% price, 20% wage	Price <sup>5</sup>	75-100% price, depending on pension size <sup>6</sup>	Nominal w - .75%	Price
8. Unisex tables used?	yes	yes	yes	yes	yes	yes
9. Imputed int.rate in annuity calculation	Exp. real w (1.6%)	0	0	Exp. real w (1.5%)	Exp. real w (1.5%)	?
<b>Safety nets accompanying NDC pillar</b>						
10. Minimum pension or income?	yes	yes	yes	MT social assistance	yes	Yes if >70
11. Contributory requirement for min?	no	25/20 yrs	10 yrs	NA	no	no
12. Is min indexed?	Price	80%P, 20%W	Price	NA	Wage minus .5% <sup>1</sup>	?
13. Is couple's rate < 200% single's rate?	yes	yes	no	NA	yes	?
14. Phase-out rate (implicit tax)	100%, 48% agst NDC pension	100% agst NDC+FDC pension	?	NA	80% agst NDC pen	30% agst NDC pen
15. % of retirees who get min top-up	68% W, 18% M	?	60% W, 40% M	NA	50% W, 5% M <sup>2</sup>	NA
16. Child care credit	yes	yes	yes	yes	yes	no
17. Credit reduced if she works	yes	yes	yes	yes	yes	NA
<b>Survivors' benefits and joint annuities in NDC systems</b>						
18. Survivor benefits in working stage?	Temp, MT, if children	If children, as DB	For children only	Yes, as DB	Yes, as DB	Yes, as DB <sup>7</sup>
19. Survivor benefits in retirement stage?	no	Yes, as DB	For children only	Yes, as DB	Yes, as DB	Yes, joint annuity <sup>8</sup>
20. Offset against wages & own-pen?	NA	yes	na	yes	yes	no
21. Joint annuities allowed from NDC?	no	no	no	no	no	yes <sup>5</sup>
22. NDC bal to widow?	no	no	no	no	no	no
23. Contribution-splitting allowed?	yes	Only FDC, at divorce	no	no	no	no

Source: calculations by author based on information provided by country informants.

Notes:

<sup>1</sup> .5% is estimate of adjustment for increased life expectancy. Therefore minimum is not fully wage-indexed.

<sup>2</sup> 88% of all minimum pensioners are women. This percentage is expected to fall over time.

<sup>3</sup> “Yes” means EPV of payouts = notional capital, given the person’s retirement age and given the mortality table and discount rate stated in the rules (which may not be same as market rates).

<sup>4</sup>  $w$  = wage growth. This amounts to price indexation if real wage growth = 1.6%, as assumed in annuity calculation, and assets = imputed liabilities for the NDC system as a whole. If real wage growth < 1.6%, indexation is less than price so real pension falls. If assets < imputed liabilities for the NDC system, balancing formula reduces the real pension.

<sup>5</sup> Between 2002-2008 partial wage indexation was used for small pensions. Indexation was frozen for 2009-2010. Price indexation is expected to resume after 2010. Guaranteed part grows at same rate as full pension amount. However, due to fiscal pressures, old age pensions were decreased by 10% between July 1, 2009 and December 31, 2012.

<sup>6</sup> Less than full price indexation for large pensions.

<sup>7</sup> Might be provided by insurance company. Balance in account would be transferred to company, which would charge a premium to cover the risk.

<sup>8</sup> Mandatory if only one spouse has a pension. Voluntary if both spouses have their own pension.

**Table 2: Simulated impact of joint annuities and unisex tables in Chile<sup>1</sup>** (monthly payouts, 2002 US\$)

Education	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post secondary
<b>Males, retiring at 65</b>					
<b>1. Individual--gender specific</b>	\$ 217	\$ 314	\$ 467	\$ 651	\$ 1,501
<b>2. Individual--unisex</b>	\$ 200	\$ 290	\$ 431	\$ 601	\$ 1,385
<b>3. Joint--gender specific</b>	\$ 179	\$ 259	\$ 386	\$ 538	\$ 1,240
<b>4. Joint—unisex</b>	\$ 175	\$ 254	\$ 378	\$ 527	\$ 1,215
<b>Females, retiring at 60</b>					
<b>5. Individual--gender specific</b>	\$ 59	\$ 83	\$ 146	\$ 241	\$ 444
<b>6. Individual--unisex</b>	\$63	\$88	\$156	\$257	\$ 472
<b>7. Widow's annuity</b>	\$ 107	\$ 156	\$ 232	\$ 323	\$ 744
<b>8. Widow's + own annuity</b>	\$ 167	\$ 238	\$ 378	\$ 564	\$ 1,188
<b>Ratios</b>					
<b>9. Widow's pensions as % of H+W pensions<sup>2</sup></b>	70%	70%	71%	72%	71%
<b>10. Widow's annuity as % of widow's+own-annuity<sup>3</sup></b>	64%	66%	61%	57%	63%
<b>11. % incr. in wife's lifetime benefits (EPV) stemming from joint annuity<sup>4</sup></b>	45%	47%	39%	33%	42%

Source: James, Edwards and Wong 2008 and calculations by author.

Notes:

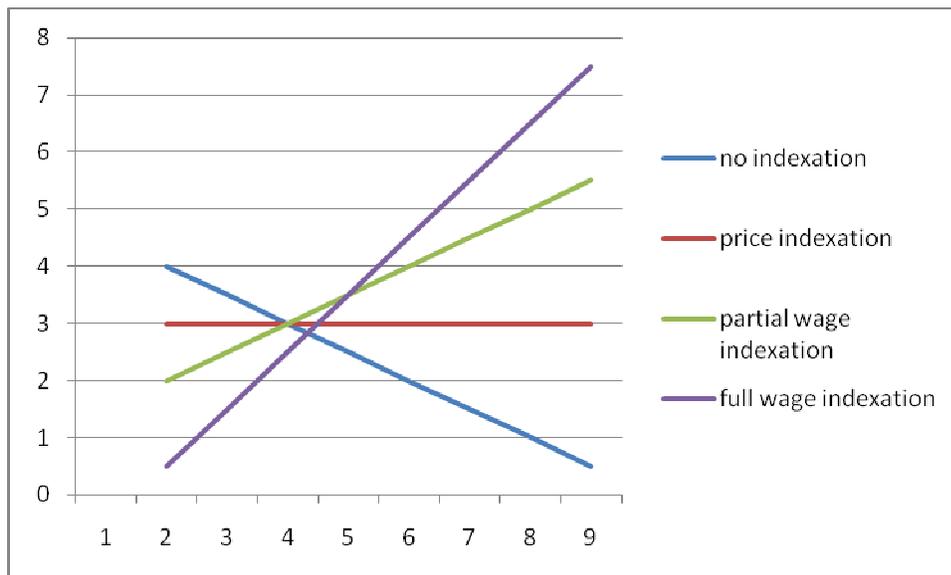
<sup>1</sup> Joint annuity assumes 60% to survivor. Wife is 3 years younger than husband. Based on actual wages and employment rates for men and women by age and education in 1994, in 2002 US\$'s, assuming 5% rate of return during accumulation stage, 3.5% during annuity stage, real wage growth= 2%.

<sup>2</sup> Pensions for widow as % of H+W pensions = (Own-annuity of wife + widow's share of joint annuity after husband dies)/ (own-annuities of husband + wife while husband was alive).

<sup>3</sup> Joint annuity for widow as % of widow's+own-annuity = widow's share of joint annuity after husband dies/(own-annuity of wife + widow's share of joint annuity after husband dies).

<sup>4</sup> EPV of widow's share of joint annuity/(EPV of own-annuity+ widow's share of joint annuity).

**Figure 1: imputed interest rate and indexation method determine the time stream of real benefits for a given retirement accumulation = EPV of lifetime benefits**



Imputed interest rate for initial payout = expected nominal wage growth in “no indexation” case; expected real wage growth in “price indexation” case; expected real wage growth – K in “partial wage indexation” case; 0 in “full wage indexation” case.

Future pensions are indexed up to nominal wage growth – imputed interest rate.

This figure assumes rising real wage rates over time.

## References

- Bernheim, Douglas, Lorenzo Forni, Jagadeesh Gokhale and Lawrence Kotlikoff. 2003. “Mismatch Between Life Insurance Holdings and Financial Vulnerabilities—Evidence from the Health and Retirement Survey” American Economic Review.
- Brown, Jeffrey, Olivia Mitchell, James Poterba and Mark Warshawsky. 2001. The Role of Annuity Markets in Financing Retirement. Cambridge, MA: MIT Press.
- Christensen, Arne Magnus, Dennis Fredriksen, Ole Christian Lien and Nils Martin Stolen. 2009. “Pension Reform in Norway.” Paper for Conference on Non-financial Defined Contribution Plans. Stockholm.
- Disney, Richard, M. Queisser and Edward Whitehouse. 2006. Neutral, fair or something else? A taxonomy of actuarial concepts used in pension-system design. Paris: OECD.
- Disney, Richard and Sarah Smith. 2002. “The Labour Supply Effect of the Abolition of the Earnings rule for Older Workers in the United Kingdom. Economic Journal. 112: 136-152.
- Edwards, Alejandra and Estelle James. 2008. “Do Individual Accounts Postpone Retirement: Evidence from Chile?” MRRC Working Paper 2005-098 (UM04-07).
- Edwards, Alejandra and Estelle James. 2010. “Labor Supply Responses of Women and Men to Incentives from the Social Security System: the Case of Chile”. Draft ms.
- Friedberg, Leora and Anthony Webb. 2006. “Determinants and Consequences of Bargaining Power in Households.” Working paper 2006-13, Boston: Center for Retirement Research at Boston College.
- Gruber, Jonathan and David A. Wise eds. 1999. Social Security and Retirement Around the World. Chicago: University of Chicago Press.
- Gruber, Jonathan and David A. Wise eds. 2004. Social Security Programs and Retirement Around the World: Micro-Estimation. Chicago: University of Chicago Press.
- Hagenaars, Aldi, Klaus de Vos and M. Asghar Zaidi. 1994. *Poverty Statistics in the Late 1980s: Research Based on Micro-data*. Office for Official Publications of the European Communities. Luxembourg.
- James, Estelle and Dimitri Vittas. 2001. “Annuities Markets in Comparative Perspective: do Consumers get their Money’s Worth?” in OECD Private Pensions Conference 2000. Paris: OECD.
- James, Estelle, Guillermo Martinez and Augusto Iglesias. 2006. “The Payout Stage in Chile: Who Annuitizes and Why?” Journal of Pension Economics and Finance.

James, Estelle, Alejandra Cox Edwards and Rebeca Wong. 2003. "The Gender Impact of Pension Reform." Journal of Pension Economics and Finance, 2 (2).

James, Estelle, Alejandra Cox Edwards and Rebeca Wong. 2008. The Gender Impact of Social Security Reform. Chicago: University of Chicago Press.

James, Estelle, Alejandra Cox Edwards and Augusto Iglesias. 2009. Chile's Re-reforms: What are they and what are the implications for individual account systems? Draft ms.

James, Estelle. 2009a. Rethinking Survivors' Benefits. Social Protection Primer paper, Washington: World Bank.

James, Estelle. 2009b. "Trade-offs Between Social Protection and Work Incentives for Women in Old Age security Systems." Working Paper, Gender and Development Unit. Washington: World Bank.

Lluber, Rodrigo. 2007. "Labour Supply of Older workers in the UK: Is there a Link with Pension Provisions?" Watson Wyatt Technical Research Paper No. 11/2007.

Munnell, Alicia and Natalia Jivan. 2005. "What Makes Older Women Work?" Issue Brief, Series 1. Boston: Center for Retirement Research. Boston College.

Munnell, Alicia and Mauricio Soto. 2005. "Why do Women Claim Social Security Benefits so Early?" Issue Brief #35. Boston: Center for Retirement Research. Boston College.

Orange Report: Annual Report of the Swedish Pension System. 2008. Stockholm.

Organization for Economic Co-operation and Development (OECD). 1982. *The OECD List of Social Indicators*. Paris: Organization for Economic Co-operation and Development.

Palacios, Robert and Oleksiy Sluchynsky. 2006. "Social Pensions." Pension Reform Primer. Washington DC: World Bank.

Palmer, Edwards. 2008. "The Market for Retirement Products in Sweden." Prepared for World Bank. Washington DC ??

Smeeding, Timothy and Susanna Sandstrom. 2004. "Poverty and Income Maintenance in Old Age: A Cross-National View of Low Income Older Women." CRR Working Paper 2004-30. Boston: Center for Retirement Research, Boston College.

Song, Jae G. and Joyce Manchester. 2007. "New Evidence on Earnings and Benefits Claims Following Changes in the Retirement Earnings Test in 2000." Journal of Public Economics. 91: 669-700.

Ståhlberg, A-C., M. Birman, A. Kruse and A. Sundén. 2004. "Pension Reforms and Gender. The Case of Sweden" in Gilbert, N. (ed.) *Gender, Retirement and Active Aging*, Transaction Publishers.

Ståhlberg, A-C., A. Kruse, and A. Sundén. 2004. "Pension Design and Gender." in Gilbert, N. (ed.) *Gender, Retirement and Active Aging*, Transaction Publishers.

UK Pensions Commission 2005. First Report. London.

Whitehouse, Edward. 2007. Pensions Panorama. Washington DC: The World Bank.

## Endnotes

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<sup>1</sup> The heterogeneity among workers means that some workers will postpone retirement because of increased actuarial fairness when the system shifts to NDC, while others continue to retire at the earliest allowable age. This may help explain the greater range of retirement ages observed, for example, in Sweden under the NDC than under its previous DB system.

<sup>2</sup> This concern that women are less likely to qualify for early retirement has been expressed in Chile and Norway (Christensen 2009). This is the price they pay for the minimum pension guarantee, which is more likely to apply to women. Having protected women, the public treasury must also protect itself from moral hazard.

<sup>3</sup> An FDC country, Chile, was also unable to equalize normal retirement ages for the genders, even as a trade-off for the large new public benefits that women were recently granted (James, Edwards and Iglesias 2009).

<sup>4</sup> The fixed rate annuity in Sweden guarantees a fixed nominal amount per month and may pay an additional rebate if the fund is profitable. The variable annuity does not guarantee any amount; instead, the monthly payout changes each year depending on investment returns and mortality rates. An individual annuity is paid only during the lifetime of the primary purchaser, whereas a joint annuity continues being paid to his spouse, after his death.

<sup>5</sup> Under such a mechanism, companies with a disproportionate number of men would pay a premium to a central authority to absorb the profit they are making due to unisex and this would be used to compensate companies with disproportionate females for their losses due to unisex. This would allow all companies to charge consumers the national unisex rate while remaining indifferent to the gender of their annuitants, so it avoids the cream skimming and insolvency issues mentioned above. However, such risk-adjustment procedures require good mortality data and considerable technical skills—both of which are in short supply in low and middle-income countries. Alternatively, a competitive bidding process might be applied to concentrate the entire annuity business in one company for a specified period, to minimize selection.

<sup>6</sup> If assets and liabilities are out of balance, this indexing mechanism can be downsized and pensions can fall, even after retirement. Indeed, all NDC countries have changed their indexing rules at least once in the few years they have existed—raising questions about whether automatic indexing really exists. In Sweden, payouts were cut by 3% in 2010 and are expected to fall another 3% in 2011, due to the financial crisis of 2008-9.

<sup>7</sup> We assume here that all sources of differences in expected lifetime are captured by gender. If the longer or shorter lifetimes stem from factors such as education or family history that are known ex ante but are not taken into account in the annuity calculation, these changes in total benefits are ex ante redistributions due to pooling people with differences expected lifetimes. If a low interest rate is combined with price indexation or no indexation at all, as in Latvia, this implies the system over-all is giving a rate of return much lower than the growth in wages.

<sup>8</sup> Flat, phased-out flat and minimum benefits all take the form  $B = F - aP$  or 0, whichever is greater, where  $B$  = non-contributory benefit,  $P$  = exogenous contributory pension,  $a$  = rate at

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which B is phased out as P increases and  $TOTP = B + P$ . For a pure flat benefit, F = fixed non-contributory benefit,  $a = 0$  and  $B = F$ . For a pure minimum pension guarantee (MPG) F= retirement income floor,  $a = 1$  and  $B = F - P$  or 0, whichever is larger. For countries with phased-out flat benefits, F = the largest contributory pension at which some non-contributory benefit is paid,  $a > 0$  but  $< 1$  and  $B = F - aP$  or 0, whichever is larger. In all three cases, B sets the floor on retirement income. F sets the ceiling on the contributory pension that qualifies individuals for B in a phased-out flat or MPG system. Retirees with a contributory pension higher than F get B only in a pure flat benefit system.

The fiscal cost of and proportion of retirees who receive B depend on the level of F and a. Holding F constant, expenditures on B will be highest in countries with pure flat benefits and lowest in countries with MPGs. However, F may vary with system, due to political economy pressures. F is likely to be relatively low in MPG countries, designed to set an income floor in the vicinity of the poverty line, and B reaches only the near-poor at small fiscal cost. In countries with pure flat benefits F may also be low, enabling it to reach all elderly residents, but at a higher total cost. In systems with phased-out flat benefits F is usually well above the poverty line, designed so that some B reaches a fairly broad group, at higher fiscal cost than MPG countries.

<sup>9</sup> An on-off switch for eligibility also creates strange patterns of work incentives—a 100% implicit tax on those far below the cut-off point or just above it, but a high marginal rate of return to work for those slightly below the bar.

<sup>10</sup> The relative expenditure needed to maintain a given standard of living for families of different sizes is estimated using equivalence scales. These scales give us an adjusted number of equivalent full cost family members by attributing different marginal costs to incremental members depending on their age and family size. Since the “right” adjustment is far from clear, several alternative scales exist. The previous OECD scale weights the first adult as 1, additional adults as .5 each, and children as .3 each. The square root scale, commonly used by the OECD at present, takes the square root of the number of family members as the divisor (OECD 1982, Hagenaars, De Vos and Zaidi 1994). Based on the previous OECD scale, the cost of maintaining a given living standard is  $100/150 = 67\%$  as much for a uniperson household as for a couple, while the square root scale implies it is  $1/1.4 = 71\%$  as much. In both cases, it costs a couple only 40-50% more than an individual to maintain a given living standard. For a single person plus 2 children compared with a couple plus 2 children, the previous scale yields a relative cost of  $1.6/2.1 = 76\%$ , while the square root scale yields a relative cost of 87%. Much of these economies of scale stem from similar housing needs for an individual and a couple.

<sup>11</sup> Remarriage is also penalized, because the widow now has another husband to support her.

<sup>12</sup> Survivors’ benefits are handled differently during the working stage in Latin America. Each pension fund purchases a group disability and survivors (D&S) insurance policy for all its members. Survivors’ benefits for widows are financed by the balance in the husband’s account, topped up by the D&S policy in an amount sufficient to purchase a defined benefit for the widow (60% of the husband’s wage). The insurance fee is an equal percentage of wages for all workers, so cross-subsidies are created. Chile has recently required a rebate into women’s accounts, to reflect their lower risk cost.