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The Gender Impact of Pension Reform¹

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Table of Contents

Introduction

Chapter 1: Living Arrangements and Standard of Living of Elderly Men and Women

Chapter 2: Why do Pension Systems and Pension Reforms have a Gender Impact?

Chapter 3: How Can We Measure the Impact of Pension Systems and Reforms?

Chapter 4: Chile

Chapter 5 Argentina

Chapter 6: Mexico

Chapter 7: Gender Issues in Pension Reforms of Other Regions

Chapter 8: Design Features that Determine Gender Outcomes

Conclusion

Tables

Appendix on Data and Methodology

Figures

References

Endnotes

Introduction

The majority of old people are women and poverty among the old is concentrated among very old women.² Therefore, in designing a pension system and pension reform it is essential to take account of the gender impact. Pension systems and their reforms may have different impacts on men and women because of their differing employment histories and demographics. This book examines alternative social security systems, their disparate impact on men and women, and the key policy choices that determine gender outcomes.

Most traditional social security systems are single-pillar pay-as-you-go defined benefit plans. In these plans a formula based on years of work and wages determines the pension promise that is made to each worker, and current payroll contributions from workers finance current payments to pensioners. Benefits are linked with contributions, but in a very loose way that favor women in some ways, hurt them in others and lead to fiscal strain in almost all cases.³

During the past two decades, new multi-pillar systems have developed to make the plans more financially sustainable and beneficial for economic growth. These systems have been sweeping Latin America, the transition economies of Eastern and Central Europe and the former Soviet Union, as well as many OECD countries.⁴ The new systems contain two separate mandatory “pillars” or financing arrangements: a privately-managed defined contribution (DC) funded plan that handles workers’ retirement saving and a publicly-managed defined benefit (DB) plan that is reduced in size compared with the old one and has the objective of redistributing and diversifying retirement income. In the defined contribution plan, the contribution is specified and placed in the worker’s individual account but benefits are uncertain a priori--they depend strictly on contributions plus investment earnings that accumulate through the workers’ lifetime. The fact that these accounts are funded, owned by workers, invested in financial markets, and don’t carry a promise of a large tax-financed old age benefit relieves the government of a future financial obligation. However, critics argue that these plans will produce lower pensions for women, who have worked and contributed less than men. In contrast, supporters argue that the new systems remove biases in the old systems that favored men

and discouraged work by women. They hypothesize that separating the redistributive function from the earnings-related saving function results in more transparent and targeted redistributions from which women will benefit.

This book aims to throw empirical light on this debate. We draw on the experience of three countries with multi-pillar systems—Chile, Argentina and Mexico—to analyze in detail the impact on the two genders of the new and old systems. We use household survey data to construct several representative men and women with typical employment histories in these three countries. We then compare the pensions that these individuals would have received under the rules of the traditional versus the new systems. In doing this, we incorporate rules that restrict payouts from the individual accounts, requiring joint annuitization or gradual withdrawals over the lifetime of the worker and his or her spouse. We include benefits from both the public and private parts of the new system—which critics have often failed to do in the past. While these three countries have in common the use of privately managed accounts, the nature of their public safety nets differ considerably, in size, degree of targeting, and incentives generated. We further broaden the sample by presenting evidence on the gender impact of reforms in several OECD countries, as well as the transition economies of Eastern and Central Europe. This variety of experiences enables us to investigate how specific design features impact men versus women. Many of our conclusions are applicable to reforms of traditional pay-as-you-go systems as well as the newer multi-pillar systems.

“Gender impact” can mean many different things. We ask:

1. What are the *relative monthly and lifetime benefits* of men versus women in the new systems?
2. How do the replacement rates (pensions/wages) of men and women compare?
3. Which gender receives *net redistributions* (lifetime benefits minus lifetime contributions or taxes) and which gender pays for these redistributions?
4. What are the *relative gains or losses* of men versus women, due to the shift from the old to the new systems?
5. *Which sub-groups* within each gender gain or lose the most from the reform and from redistributions under the new systems?

6. What are the *incentive and disincentive effects and potential behavioral changes* stemming from these redistributions?
7. What are the *key policy choices* that determine these gender outcomes?

Pension analysts have disagreed on whether the reforms are good or bad for women partly because of the paucity of careful quantitative evidence and partly because different studies have focused on different gender indicators instead of looking at the whole picture.⁵ For example, looking at monthly versus lifetime benefits will produce different results because women live longer. Looking at redistributions gives us yet another perspective, because women may receive net transfers even though their gross benefits are lower. Looking only at the proceeds from the private accounts rather than the sum of all proceeds from both pillars will also yield a different story. Putting together all the indicators listed above forces us to think through which gender outcomes we care about most and how we can best design the new public and private pillars to achieve them.

At least two different approaches are possible in an analysis of pension outcomes. Some think of pensions as a payment from the government's general revenues, which should be allocated according to principles of fairness. This leads to questions such as: is it fair to treat market work different from homework? Is it fair to give lower pensions to women because they have interrupted their careers to raise children and care for the elderly? Is it fair to give people lower pensions because they have earned lower wages?

An alternative approach is to think of pensions as deferred consumption by the individual. The individual puts aside some of his or her earnings when young in the form of contributions that provide an income for his or her consumption when old. The neutral position in this approach is that lifetime pensions should equal lifetime contributions of the individual—unless society explicitly decides to redistribute. This book adopts the second approach. We do so because it is factually correct that if benefits exceed contributions for one sub-group they must be financed by excess payments made by some other sub-group. Which group should be forced to subsidize another group and which should receive subsidies depends on value judgments, about which people may disagree, and also generates incentives that can influence behavior for good or bad. This approach leads to questions such as: how would monthly and lifetime retirement incomes of men

and women compare in the absence of redistributions? Which types of redistributions do we observe and which are desirable? Are the transfers structured to encourage or discourage market work? How are they financed and how should they be financed?

What do we find? In a nutshell: we find that in Latin America the new accounts give women substantial monetary accumulations of their own, perhaps for the first time. However, because of women's lower lifetime earnings, these accumulations and the pensions that they generate are much smaller than those of men—as will be the case in any system that closely links benefits with contributions. Women's retirement accounts are typically only 30-40% as large as those of men.

But this annuity from their own accounts is only the beginning of the story. The public benefits in the Latin American reforms are targeted toward low earners, and low earners are disproportionately women. Restrictions on payout provisions from the private accounts, particularly requirements that married men purchase joint pensions that will cover their wives after they die, also play a key role in improving the position of women in most new Latin American systems. Widows are permitted to keep both their own pension and the joint pension, so formal labor market work is not discouraged, as it was in many old systems that forced them to choose between the survivor's benefit and their own benefit.

The net result of these public and mandatory private arrangements in our three countries is that total lifetime retirement benefits for the average married woman are projected to reach 65-95% those for men and for "full career" married women to exceed those for men. Women get positive transfers, from the public treasury or from the family, which means they get back more than they have paid in. In fact, it turns out that female/male ratios of expected lifetime benefits in the new systems exceed those in the old systems in all three Latin American countries that we have studied. But which subgroups of women gain the most varies by country, mainly because of the role of the public benefit.

The public benefits of these countries have in common that they are targeted toward low earners. Clearly, support is most universal for subsidizing low earners, for poverty prevention. Low earners often do not earn enough to consume when they are young as well as save to support themselves when they are too old to work productively.

Public funds are needed for this purpose. We observe that some systems subsidize other groups, for other reasons--to improve gender equality beyond the poverty level, to protect married women from the possible myopia of their husbands, etc., but these are more controversial and less universally accepted. As a result, the public benefit takes many different forms, reflecting different objectives and priorities across countries. It emphasizes poverty prevention and low tax costs in Chile, work incentives in Mexico and broader access to benefits, with less regard for costs or work incentives, in Argentina. Consequently, different sub-groups of women will benefit the most and different behaviors are encouraged in each case. As policy-makers in other countries evaluate their options, they need to decide which women and families have priority needs on public resources, which needs can best be accommodated by private resources on a mandatory or voluntary basis, and which incentives they want to include in their old age systems.

Chapter 1 starts with a summary of the living arrangements of older women and men and how the standard of living of the two genders compares, in old age. Chapter 2 provides an overview of demographic and labor market differences between men and women and generates hypotheses about how men and women might be affected differentially by pension systems and reforms. Chapter 3 sets forth the methodology we use to analyze this issue empirically. Chapters 4-6 examine in detail the recent multi-pillar reforms in Chile, Argentina and Mexico, including the expected pensions for men and women from the new private accounts, and how this is modified by public transfers and annuitization rules. We evaluate which sub-groups gained and lost the most from the shift to a new system and which behaviors were rewarded by the new system. Chapter 7 contrasts the Latin American situation with that in selected transition and OECD economies, where the policy choices and gender implications have been quite different. Chapter 8 returns to the need to make the value judgments raised above and asks: what are the key objectives and trade-offs of a gender-sensitive pension system and what are the key policy choices that determine these outcomes? The Conclusion summarizes lessons for policy-makers. Since old people are disproportionately women, a system that does not protect women can hardly be said to protect the old. We hope this study will help policy-makers design their reforms with this thought in mind.

Ch. 1: Living arrangements and standard of living of elderly men and women

In most countries, women have lower own-incomes than men. But most elderly men and women live with others in a variety of household structures, so their living standards depend on these living arrangements and the income of the other people in the household, as well as their own income. For married women, the income of other family members—first husband and later children—is even more important than their own income, especially in traditional societies. Women with low earnings and without an extended family are likely to be disadvantaged financially, especially when they grow old. Mandatory old age programs can be structured to reduce this disadvantage.

I. How Household Structure Impacts Living Standards of Women versus Men

The nuclear family in old age

As men and women enter old age, typically they are married and living in a nuclear family structure (i.e. a family with a “head,” spouse and possibly their children). At this point, the husband is generally the main source of monetary income, earning much more than the wife, but this becomes “household income,” for both spouses. The wife’s standard of living depends on the husband’s income, whether or not that income is divided equally. This is clearly true of the three Latin American countries we have studied, which have traditional family structures, and it remains true in many industrialized countries.

Widows and single women

The husband, however, is likely to die before the wife, so she becomes a widow. In each of our three countries, women are much more likely to be widows than men are to be widowers (Table 1.1A). In Chile, 41% of women over age 60, but only 14% of men, are widows. In Argentina and Mexico the proportion of widows is even higher--45% and 47%, respectively--while the proportion of widowers remains 13-15%. Elderly women are also more likely to be single or divorced (10-11% for men, 11-13% for women.). This disparity also holds in other countries, and it grows with age. In the U.S., 34% of women but only 7% of men age 65-69 are widows, while in the 80-84 age group these numbers

are 72% and 27%, respectively. In the 85%+ age group, 48% of men but only 9% of women are living with their spouses (Posner, pp 139, 277). This means that the majority of elderly women are without spouses and the material and moral support that spouses bring, while three-quarters of elderly men still have their partners (and most live in nuclear families with them).

Extended families

When the husband dies, household costs fall since they are now incurred by only one person, but household income falls further because the wife's own-income is usually less than that of her husband. If nothing else intervened, the woman's standard of living would fall. But the widow's children (if she has them) can limit this fall by inter-household transfers while she lives alone, or by incorporating her into their extended households. In Mexico 18% of elderly women (15% of men) receive family transfers and 43% of women (35% of men) live in extended families. In either case, her standard of living now depends on the income of her children and not simply on her own income.

Among elderly women who are no longer in a nuclear family, the vast majority live in extended family arrangements (Table 1.1B). On the one hand, if the per capita income of young families is relatively high, the standard of living of the widow will now be relatively high—perhaps even higher than before when she lived in a nuclear family. This might occur because younger people have skills that are highly valued in the labor market in a context of recent rapid educational and economic growth. On the other hand, if the per capita income of young families is relatively low, the standard of living of the widow will also be relatively low—lower than it was before. This might occur because the main breadwinners of young families are at a low point on their age-earnings profiles and they have many children who must share the family income.

Diversity in uni-person households

However, all widows with children do not move into extended families—choice is sometimes involved. The extended family arrangement benefits from scale economies and easy exchange of non-monetary services, but at a cost in terms of lost privacy to both sides. We expect that widows with children are more likely to opt for uniperson households if they are members of wealthy families that can afford to spend money on privacy and services. This sub-group might have an above-average expenditure level due

to selection of wealthy women into uniperson households (and vice versa for poor women selecting into extended families).⁶

Another sub-group of women live alone because they have no choice. This sub-group consists of widows without children and those who never married. Living alone is much more common for the elderly than for prime-age adults, and it is especially common for women. Those who live alone because they have no choice are likely to have below-average income and expenditures due to the lower own-incomes of women and the loss of spousal income.

Thus, uni-person households consist of two disparate groups: those who choose to live alone because they can afford to do so comfortably and those who have no such choice. When mixing these two groups together, we don't know which will dominate and are therefore unable to predict the relative position of the group as a whole. We would expect, however, to find a pocket of poverty here--the sub-group with no choice will be relatively poor.

Women who actually become very old are more likely to come from the wealthy sub-group, given the positive correlation between longevity and income or wealth. Thus, in a cross-sectional analysis, selection reinforced by survival bias could cause very old women living alone to appear to have relatively high standards of living, on average. But the pockets of poverty may deepen at the same time, for the small group of low-income elderly women who have survived. They will have used up any savings, will be unable to work and their pensions, if any, will become smaller relative to growing wages around them.

Elderly men versus women

The biggest difference between the living arrangements of elderly men and women is that the men live predominantly in nuclear households that they head, while many women live in extended families headed by younger members. Consequently, the relative well-being of elderly men versus women (as measured in terms of family income per capita) depends intrinsically on the inter-generational comparison between "old" and "young" households, even more so than on the own-incomes of men versus women in the same generation.

To the degree that women share in the standard of living of their households, we would expect to find two alternative patterns:

1. If “young” households are poorer than “old” households, elderly women (many of whom live with their children in extended families) are likely to appear poorer than elderly men (who tend to live in their own nuclear households); and
2. If young households are richer than old households, elderly women are likely to be at least as well off as men because they benefit from the higher consumption standards of the extended families with which they live.

In addition, for reasons given above, we would expect to find pockets of wealth (selection and survival bias) and poverty (own-income effect) among elderly women living alone.

II. Empirical Evidence—Methodological Issues

Equivalency scales when family size and composition differ

With this as background, we proceed to examine the standard of living of elderly men and women, as measured by the per capita income of the households in which they are living. Our empirical task is complicated by these different living arrangements.

When more than one person lives in a household, some of their consumption goods are, in effect, “public” goods, of which everyone in the household partakes. For example, the dwelling may have one kitchen and bathroom, which everyone uses. These public goods create household economies of scale—which enable two persons to maintain a given living standard for considerably less than double the amount it would cost one person to maintain that same level of comfort.

But part of the family’s consumption consists of private goods, which only one person can consume. When I eat an apple it means that you cannot eat the same apple. The division of household consumption between public goods and private goods may differ systematically by size of family and age of members, so calculations of average standard of living per family member (total household income or expenditure divided by the number of household members) requires an adjustment for these factors, using “equivalence scales”. In making this adjustment, typically different marginal costs are

attributed to incremental family members depending on their age and family size, but all members are assumed to enjoy the same standard of living.

Exactly how this adjustment should be done is far from clear. The fact that small children may consume less food and space than adults often leads to a lower weighting for children in calculating the adjusted number of family members. However, if the mother works in the labor market, the advent of a child may impose large monetary expenditures for child-care and other household services. In such cases, one might argue that children, especially the first child, should be weighted more heavily than adults—but this is rarely done. For similar reasons, very old people are sometimes weighted less heavily than prime-age adults. However, it is also possible that the elderly will incur large medical or custodial expenses that are not covered by insurance; in these cases, it might be appropriate to weight old people more heavily than young people.

As a result of these and related issues, several equivalence scales exist. The “modified OECD scale” that is often used weights the first adult as 1, additional adults as .5, and children less than 14 years of age as .3. The square root scale takes the square root of the number of family members as the divisor to determine adjusted per capita income (OECD; Hagenars, Vos and Zaidi 1994). The modified scale implies that the cost of maintaining a given living standard is 67% as much for a uni-person household as it is for a couple, while the square root scale implies it is 71% as much. When an old person joins a household that consists of two prime-age adults and 1 child, the net addition to household adjusted members is $.5/1.8$, so total household income must go up by 28% to enable other family members to maintain their previous standard of living according to the modified scale, while according to the square root scale total cost rises from 1.7 to 2, or 18%. This compares with a required increase of 33% to hold constant unadjusted per capita income. Other scales weight older people differently from prime-age adults. Clearly, calculations of the relative well-being of people with different living arrangements and of young versus old households will be very sensitive to choice of equivalency scale. Our figures on per capita income and poverty rates rely primarily on the modified OECD scale, in which children are weighted less heavily than adults (Table 1.3).

Bargaining power and non-monetary services

Besides these accounting issues, we don't really know how the private goods in the family are divided between its members. The equivalence scales given above may not correspond to the actual bargaining power of diverse family members. In some traditional cultures, old people own the family wealth and dictate the division of family consumption, so the elderly of both genders may fare better than indicated by these equivalence scales. But in modern societies the fact that prime age males are usually the major breadwinners may give them predominant control over what is purchased and for whom, so the elderly may fare less well. Elderly men contribute more money than elderly women, so they may have greater bargaining power than women—both in extended and nuclear families. The likelihood that private goods will not be divided equally among household members due to differential bargaining power means that all members do not end up with the same “average” standard of living—but usually we can only observe the average.

Additionally, non-monetary household services contributed by family members are not included in these analyses. Women contribute more non-monetary services than men, which may raise the living standards of households with elderly women, as well as the bargaining power of these women. Similarly, the elderly who live in extended families may receive non-monetary services, such as custodial care, from their children, which raises their standard of living. As women grow very old they are more likely to require than to provide such services, and they are less likely than men to be able to contribute monetary wealth to the household. This may place them at a disadvantage in the family's pecking order. Data are usually not available on non-monetary services, but they undoubtedly play an important role.⁷

III. Empirical Evidence--Results

Comparisons of own-income

As expected, based on own-income older women are much poorer than older men (Table 1.2). In urban Chile, only 11% of women compared with 38% of men have some wage income, and among these the average amount is 60% greater for men. Men are also more likely to own their own housing (imputed rent). Pensions are the largest source of

own-income or the elderly. Men are more likely to have old age pensions (62% versus 31% for women), while women are more likely to receive survivors' benefits or PASIS--the means-tested social assistance pension (both of which are much smaller than male pensions). Taken together, 74% of all old women and 98% of all old men in urban areas have some source of own-income, but the average amount is more than twice as large for men. These disparities are even greater in rural areas, where almost one quarter of all elderly women qualify for PASIS.

The same story applies to Mexico. There, only 17% of older women but 61% of older men have some salaried or self-employment income (and for women this is mainly low paid self-employment). Nine per cent of women but 19% of men receive a pension—and this is mostly an old age pension for men, a smaller widow's pension for women. In contrast, more women than men receive intra-family transfers. Analysis of the distribution of these transfers shows that they go predominantly to those who do not receive a pension—crude evidence of crowd-out.⁸ Interestingly, transfers are an equalizing force between the genders—they are the only income source that goes more heavily to women. Altogether, 37% of women but 80% of older men receive some own-income and, among these, the average amount is almost twice as large for men.

A similar picture emerges in Argentina, although the disparity isn't as striking: In urban areas 67% of older men and 55% of older women report some own-income, and the average amount is 50% greater for men. About half the elderly receive pensions. Interestingly, in view of the description of Argentina's old age system that follows (especially the role of the flat benefit), the proportion is the same for both genders and the amounts are less disparate than in the other two countries.

Living standards in young vs. old households and implications for the gender gap

As we have seen, in the presence of the extended family the lower own-income of women does not mean that they have a lower standard of living than men. In Chile, households without any elderly members have lower per capita incomes than households with elderly numbers when using the OECD scale (Table 1.3A). The former are probably households with young adults at the start of their careers, and with many small children. Families with two elderly—which tend to be nuclear families—have the highest incomes. Many of these are families just past the peak of their earnings, possibly with some

savings, and with a high permanent income that is signaled by their longevity. Similarly, families without elderly members are most likely to be living in poverty, while nuclear families of two elderly are least likely to be below the poverty line (Table 1.3B). These relative positions are important when deciding on the relative importance of public subsidies to the elderly as a group versus young families with children.

Above, we conjectured that if young families had relatively low incomes, this would lead older women to have to lower incomes and higher poverty rates than older men. And that is exactly what we find (Table 1.3C). According to the OECD scale, poverty rates for elderly women are 50% higher than for men in urban areas, 150% higher in rural areas. Poverty is concentrated in very old women living in extended families or living alone because they have no children; it is very gender-specific rather than being widespread among the elderly (Tables 1.3 D). This has implications for how to target anti-poverty policies.

In contrast, in Mexico, families with young members tend to have less poverty than those with older members. Above, we predicted this inter-generational pattern would cause the gender gap to disappear among the elderly, as older women benefit from the higher incomes of their children. And again, this is exactly what we find. Poverty rates are almost identical between older men and women. Argentina is in-between the two opposite cases of Chile and Mexico. Adjusted per capita income and poverty rates are much more similar for families with young and old members than in the other two countries. This, plus the fact that pensions are received in roughly equal proportion and amounts by both genders, tends to equalize the poverty rates of elderly men and women (Table 1.3C and D).

Do elderly members raise or lower living standards in extended families and what are the implications for their bargaining power?

As we saw above, many old people bring some income of their own into the household. For Chile, we compared their own-income with household income, to see if they are net benefits or costs to the household. To accomplish this, we calculated unadjusted per capita family income with and without the addition of the older member(s). In Chile, where income is relatively high among the elderly, older men increase family per capita income in 85% of the cases, while older women increase it in

only 44% of the cases. Moreover, the typical increase by women is much lower (and the typical decrease much larger) than for men. On average, adding an elderly man to a household without one raises its per capita income by 27%, while adding an elderly woman decreases it by 6%.

This, of course, is a function of the larger own-incomes of men and it may give men greater bargaining power to secure a larger share of total household resources. If men have saved some of their past income and plan to leave it in bequests to heirs of their choice, this too increases their bargaining power. At the same time, women make larger direct contributions to non-monetary household income, which do not show up in these data. As women grow very old their ability to contribute current non-monetary services decreases and such services can't easily be saved for later delivery or bequests, as men can do with their monetary income. Therefore, the gender disparity in contributions is expected to increase in very old age, which may decrease the power of very old women to bargain for their share of family resources.

In sum:

1. Older men have higher own-incomes (wages and pensions) than older women. Men are likely to live in nuclear families, where this income is shared between husband and wife.
2. Older women are likely to become widows and widows are likely to live in extended families, so their standard of living is determined by the income of the family with which they live. If the income of young families is relatively high (as in Mexico), this narrows average measurable gender differentials in living standards among the elderly, while if young families are relatively poor (as in Chile), gender differentials persist. However, measurable differentials may differ from actual differentials that depend on the bargaining power of various household members; and the bargaining power of very old women may be relatively low.
3. Although selection plus survival effects and own-income effects push in opposite directions from own-income effects, the poverty rate tends to be highest among the very old, who are mostly women.

Women in old age live with and are protected by their extended families, far more than men. This may be considered a consequence of the informal family contract—traditionally, women have worked in the home providing non-market services, while their husbands and subsequently their children provide monetary support for them. So long as this system works, it keeps older women who haven't worked in the market out of poverty and with reasonable living standards compared to others in society. But the family system, of course, doesn't always work. This raises a number of questions for pension policy that we shall return to in the following chapters:

If the public pillar is targeted, as in means-tested programs, should it take individual or family income into account in allocating subsidies? If the former, it may spend large amounts redistributing to women whose standard of living is actually quite high *ex ante*, because of family support. If the latter, it may discourage families from supporting their older members. The informal family contract is difficult for older women to enforce on their own. Should public policies be designed to enforce and formalize this, by requiring family support for older women? Such arrangements may be criticized for creating a relationship of dependency—but dependency will disappear only when women's labor market roles converge to those of men, so that women become financially independent. In the meantime, what happens to those who do not have welcoming families—who are single or divorced or widows with no children or with poor children? And what will happen if the family system breaks down before the labor market and social norms have equalized own-incomes for men and women? How can public pension policies plan for and alleviate these potential problems?

Chapter 2: Why Do Pension Systems and Pension Reforms Have a Gender Impact?

Most public pension programs—both the traditional defined benefit and the newer multi-pillar plans—are contributory—financed by payroll taxes and paying benefits that depend on wage history, years of work, or more directly on contributions. These contributory schemes are sometimes supplemented by a uniform or means-tested pension that is more universal, based only on age and residence and financed by general revenues. But the contributory part of the program usually dominates.

Contributory social security systems have developed for a variety of reasons:

- Pensions are viewed as a source of income that replaces part of the wage, when old age makes work difficult or less productive, hence a connection between pension benefits, wages and payroll taxes seems logical.
- If benefits are linked to contributions, workers may be willing to contribute over and above the taxes they would otherwise pay for public services, since they perceive this as a payment for services that are specifically earmarked for them rather than a tax for the general treasury.
- Workers who evade these contributions pay the price in terms of foregone benefits, rather than passing this cost on to the common pool—this is particularly important in developing countries with weak tax enforcement mechanisms.
- Basing the tax on payroll rather than general income limits the redistribution involved and therefore increases the support of high earners for the plan.
- Payroll taxes from large employers are relatively easy to collect.

However, these arrangements pose a problem for women, who are likely to have worked and contributed for fewer years, earned lower wages when working, and outlive their husbands who provide the family's monetary income. As a result of these socio-economic and demographic differences, the same pension policy may have different effects on men and women and pension reform can have important gender effects. Moreover, social security systems often include rules that explicitly differentiate between men and women. This chapter reviews these labor market and demographic differences and the issues they raise for pension policy.

I. Differential Labor Market Histories

Labor force participation rate

Women traditionally have less continuous labor force attachment than men. The intra-family division of labor has typically resulted in men working in the market, women in the home. Even when women work in the market, this attachment tends to be temporary and part-time. It is more likely to be in the informal sector, which is not covered by formal social security schemes. Women's work may be interrupted to have children and raise them, care for elderly parents or sick members of the family, etc. Consequently, women, especially married women with children, are in the system for far fewer years over their lifetimes—roughly 50-70% as many years in our three sample countries (Tables 3.3, 4.3, 5.3).

A large gender gap persists in industrial countries too, even though it has been declining in the last two decades. In the UK, Canada and Australia in 2000 the female labor force participation rate is still 10-15% below that of men (compared with 25-35% in 1980). In OECD countries as a whole, the gender gap is only 12% for women without children, but jumps to 32% for women with two or more children; the latter group, however, is becoming smaller as fertility falls in these countries. And much of this work is only part time: On average in OECD countries, 26% of women but only 7% of men work part-time. In Switzerland, Norway and the UK, over 40% of women but less than 10% of men work part-time (OECD 2003). In the U.S. women's labor market experience is converging to that of men, and younger cohorts are more likely to remain in the labor force throughout most of their adult lives, but a gap still exists. In 1960 the female labor force participation rate was less than 50% that of men, in 1980 it was 75% that of men and in 2000 the ratio had risen to 87% (U.S. General Accounting Office 1997 and OECD 2003). However, the convergence process is very gradual and the growth in female work propensities seems to be slowing down. In the transition economies of Eastern and Central Europe female work propensities are actually declining and the gender gap is increasing (Woycicka et al 2003). Traditional roles continue to dominate in most developing countries.

The lower work propensities of women raises a key policy question—to what extent should public benefits compensate for lower pension rights that they accumulate and to what extent should family support be required for this purpose, in return for the non-market work that women perform? We will return to this issue in chapter 7, after discussing how the old and new systems in our sample countries have handled this question.

Wages

Women typically earn less per week or year of work than men, even after controlling for age and education. This may be due in part to their lower labor force attachment (past experience and expected future tenure), in part to occupational segregation, and in part to social norms that condone lower pay to women. In our three sample countries, at age 20 women earn almost as much as men, but the disparity increases with age and by age 50 they earn only 60-70% as much per month of work (Table 3.5. 4.5, 5.5).

The gender gap in work and pay is smaller, but still significant, in higher income countries. For example, in the UK, Canada and Australia hourly wage rates for women are 15-30% less than that of men (Ginn et al 2001). Much of this gap may be due to differential experience in the labor market—at any given age women have less work experience than men and less assured continuity of future work, which in turn influences the jobs they chose and are chosen for. In the U.S., median earnings for full time women are 70% those of men, and the gap is cut in half when age, education, work effort and other relevant variables are controlled (U.S. General Accounting Office 1997). Nevertheless, the earnings differential and much-noted “glass ceiling” remain. Thus any pension system that links benefits to earnings or contributions is likely to produce lower benefits for women. Should old age systems include a component that is not contributory and does not depend on earnings?

Front-loading of women’s earnings

Women tend to concentrate their total earnings at an earlier age than men. This occurs because they work when young but frequently drop out of the labor market when bearing and rearing children, and because their age-earnings profiles are less steep than those of men, in part because of interrupted careers. A system that bases the pension on

nominal earnings without adjustment for economy-wide price and wage growth therefore disadvantages women, while a system that places heavier weight on early contributions through a compounded rate of return, benefits women.

Provisions in old age systems that augment or diminish these labor market effects

Provisions that offset low work propensities and earnings. Most systems contain provisions that mitigate the impact on pensions of women's interrupted careers, part-time work and low earnings. For example, the contributory occupational plan in the Netherlands is accompanied by a flat public benefit based mainly on residence, not employment. Individual accounts in Argentina are supplemented by a flat benefit that depends on employment, but with only a ten-year eligibility requirement. Australia features a broad-based means-tested public benefit that most old people get, in addition to their defined contribution plan. Many countries (Chile, Kazakhstan and Poland) have a minimum pension guarantee that underlays the other parts of their system and protects women with limited work histories. These flat pensions and minimum pensions are often set at 20-25% of the average wage. In the US and Switzerland, a progressive benefit formula gives a high rate of return to women with partial careers. Most OECD countries (except for the US) give credits toward their public benefits, for years spent in child care. Most countries have a ceiling on earnings counted toward benefits.

These measures reduce the gender gap in pensions due to low labor force participation and earnings of women, but do not eliminate it completely. Minimum pensions increase the female/male ratios at the low end of the earnings spectrum, benefit ceilings increase it at the high end, and flat benefits tend to equalize in the middle as well. As we shall see later, their effectiveness depends in large part on eligibility conditions and indexation rules. Exactly which measures are used can have a large impact on women's incentives to work.

Provisions that add to the labor market effects: early retirement age for women. Rules of the system sometimes allow women to retire earlier than men, thereby exacerbating the gender pension differential. For example, women are permitted to retire five years earlier than men in Chile and Argentina. In most transition economies of Eastern Europe and the former Soviet Union, women can retire 3-5 years earlier than men. This enables them to retire at the same time as their husbands, who tend to be

several years older. It is sometimes argued that working women have two jobs—one at home and a second in the market—so they are “entitled” to retire earlier, in compensation. But it is a costly compensation, to the women and the economy. Early retirement may seem to be a privilege—appreciated by women who don’t enjoy their work and prefer leisure—but they pay the price later on in terms of lower pensions. It may also discourage employers from hiring or promoting older women, for fear they will retire soon. The loss of experienced labor reduces the country’s GDP.

In traditional defined benefit systems women were often permitted to retire early without an actuarial penalty—this meant that early retirees were subsidized by others. In contrast, in “actuarially fair” systems workers who retire early get a lower monthly pension to compensate for the larger number of years they will be receiving it. Annuitization arrangements in most new defined contribution systems are actuarially fair and require retirees to live within their own retirement accumulations—this means that early retirees receive a lower annual pension than they would at a later age. This cost may not be fully realized until the woman is too old to reverse her decision to retire early. Should retirement ages be equalized for men and women to avoid such myopic choices?

Less education for girls in low and middle-income countries

In low-income countries, children of both genders often do not attend secondary school or even complete primary school. However, girls are less likely to do so than boys. Families are more likely to invest in the schooling of their sons, because of the expectation that sons will use these skills in the labor market and will become the future financial supporters of the extended family, whereas girls are expected to marry, leave their parents’ home, bear and raise children and provide household services to her future husband and his parents. However, the lack of schooling for girls inhibits their ability to work productively in the labor market even if they should wish to do so, for their entire lifetimes.

In the process of development this attitude toward women’s education changes and schooling tends to be equalized between the two genders. For example, comparing mean years of schooling for urban men and women in Mexico in 2000 across age groups, we see that men had at least one year of schooling more than women (roughly a 20% increment), for all ages over 35. However, for younger ages the schooling differential

declines and reaches virtual equality for men and women under 25. Years of schooling increased for both genders for successively younger birth cohorts, but much more so for women, so they caught up to men (Mexican Census 2000, IPUMS). Similarly, in Chile in 2000 among urban women in the age group 56-64 (which is just about to retire) only 11% had a university degree, compared with more than double that number—23%—for men. But the proportion of younger women getting higher education trebled by the cohort age 15-26 (who are just entering the labor force), while for men the increment was very small, so currently there are more young women than men in the top educational categories (University of Chile Employment Survey 2000).

We know that the labor market returns to education are high and, moreover, that females' labor market participation is strongly correlated with their education (much more so than that of males). If schooling raises their potential market wages faster than the value of their household production, it follows that more educated girls will face incentives that make it attractive for them to work. In contrast, those without schooling will find it more advantageous to stay at home. In the following chapters we present empirical evidence of higher labor force participation rates among more educated women on a cross-sectional basis, and of rises in aggregate female participation rates over time as education among females has increased in the three countries we have studied.

Here we simply note that decisions made by families about the education of their girl children leaves a long legacy—it affects their employment prospects and work propensities in adulthood and their pension prospects in retirement, 50-60 years later. The differential labor market role and pension access among older men and women today is due, in part, to family decisions made many years ago, and this effect will persist for many years, until the new generations of females with greater schooling fully replace the cohorts with lesser schooling, in the economically active and retirement stage of life. The gradual positive change we observe now in women's market role is due, in part, to this transition to higher education. (And, of course, the growing expectation of families that their girl children will work adds to their willingness to educate these girls—causation runs both ways, reinforcing both trends, in the process of economic development).

II. Demographic and Biological Differences

Longevity

In most countries, women at age 60 have a life expectancy that is 3-5 years greater than that of men. From this vantage point, women should retire later, not earlier. In Chile a 60-year-old woman is likely to live another 23 years, while a 60-year-old man lives another 19 years and a 65-year-old man lives only 15.5. A woman who retires at age 60 has a future lifespan that is 7.5 years more than her husband has when he retires at age 65. This is a typical retirement period differential in Latin America and the transition economies.

The disparity in life expectancy increases with age. In the U.S., the ratio of females to males still alive at age 55-64 is 1.1, at 75-84 it is 1.5 and above age 85 it is 2.5 (US Census 2000). The gender disparity has also been increasing through time, over the past half century. Increasingly, very old people are women.

Women who have specialized in home rather than market production face a particular problem as they age: they may become less productive in the home but have no monetary savings of their own to live on or to contribute to the family in lieu of in-kind services. Thus, they are more dependent on the accumulated “good will” of the family, for many years of old age. What steps should public policies take to reinforce this good will or substitute for it in cases when it fails?

For women who have worked in the market and have acquired retirement incomes, annuitization--which provides longevity insurance--is especially important, given their extended expected lifetimes and the large variation around the mean. Defined benefit systems pay a lifetime benefit that is like an annuity. In a defined contribution plan the accumulation in the individual's account can be turned into an annuity upon retirement, and this is sometimes required. But, because they live longer, any given retirement accumulation yields lower annual benefits to women if gender-specific tables are used, as in Latin America. In contrast, defined benefit system implicitly use unisex tables (acting as if men and women have the same expected lifetimes), since they generally do not use gender-differentiated rules to determine benefits. A key policy choice: should annuitization be required for the individual accounts, to provide life-long

income security, and should gender-specific tables or unisex tables be used by companies issuing the annuities? As we shall see, different countries have answered these questions very differently.

Widowhood

The greater longevity of women also means that they are more likely to become widows than men are to become widowers; hence survivors' pensions are of key importance to women. The social custom for husbands to be older than wives exacerbates the importance of survivors' benefits. In Chile, 41% of women over age 60, but only 14% of men, are widows, and the numbers are similar in Argentina and Mexico. In Chile women in urban areas are almost as likely as men to receive a pension. However, for women the pension is a widow's or social assistance pension in almost half the cases, while for men it is almost always an own-earned pension. In Mexico the disparity is even greater (Table 1.2). Without survivors' benefits, non-working widows are likely to find themselves without monetary means and even widows who have a pension of their own find their household income cut by far more than their cost of living when their husband dies, due to household economies of scale (see chapter 1). In a group of nine OECD countries, for women age 65-74 becoming widowed implied a fall in income of 20-33% (Casey and Yamada 2002). As a result, poverty among the old tends to be concentrated among very old women. In the US in 1997, poverty rates were less than 5% for elderly women in married couples, but 18% for widowed women, who constituted 45% of all women over age 65 (NEC 1998).

Survivors' benefits are often included in social security systems, but the precise arrangements vary. Publicly provided survivors benefits are being downsized or phased out in Central and Eastern Europe. Joint annuities play a major role in the new Latin American systems. Two key questions: 1) Who should finance the widow's benefit, the state or the husband? And 2) if a woman has worked in the labor market should she have to give up her own-pension when she gets the widow's benefit? In the old systems, typically survivors' benefits were financed out of the common pool and often women had to give up their own benefit to receive it. This was regressive because widows of high earners got the largest benefits, for which neither they nor their husbands paid. At the same time, the opportunity cost was especially great for women with high earning

potential and labor force participation. They may have been discouraged from working and contributing, with little or no incremental pension benefits. In the new systems survivors' benefits are required to be purchased by spouses and women can keep their own annuity as well. This impacts women's incentive to work in the labor market, as well as their standard of living in very old age.

Decision-making power within the household

Part of the person's income during the retirement period comes from voluntary saving. According to the life cycle model, individuals accumulate saving while young and working and use them up after retirement. The amount they save and the rate at which they dissave depends on their expected lifetime. The distribution of decision-making power within the household then determines whose lifetime enters into this calculation. Recent evidence indicates that the individual who generates most income also has most decision-making power. This is usually the husband. If he takes into account primarily his own expected lifetimes in making saving and insurance decisions for the family, this may lead to under-saving and insurance in younger years and under-consumption for widows in later years, leaving the widow poor and sometimes a burden on the public treasury (Berheim et al 2003, Friedberg and Webb 2006).

This issue does not arise in defined benefit social security systems, which mandate the contributions and payout rate—the individual has no choice. It does arise in voluntary retirement saving plans and in mandatory defined contribution plans that give retirees a choice of payout modes. Many countries with individual account systems require that payouts take the form of joint annuities or gradual withdrawals spread over the lifetimes of the individual plus his or her spouse, to overcome this problem.

Divorce, co-habitation and single parenthood

While widowhood is the greatest problem for older women in traditional societies, in richer countries divorce or co-habitation without formal marriage are becoming increasingly common. In both cases, women may allocate part of their time when young to bearing and raising children with the expectation that their partners will provide their financial support when old—they may think an inter-temporal trade has been made. But the husband may not fulfill his part of the bargain if divorce occurs or if the co-habiting arrangement is broken. Public programs sometimes include provisions for these

situations. For example, in Switzerland and Canada pension credits are split upon divorce. In the U.S. marriages lasting ten years generate a spousal and survivors' benefit for the divorced woman whether or not there is a subsequent wife. In Chile survivors benefits and the minimum pension guarantee cover the non-married mother of a man's children (as well as his spouse). But many countries overlook these groups. In the new systems, where funds build up in accounts, countries must decide whether spouses and partners are required to split these assets when the relationship dissolves. Mexico and Argentina have no regulations governing such situations. Chile, which has just legalized divorce, is grappling with this problem now.

How do these forces change over the process of economic development?

As countries develop, the labor force role of women tends to grow closer to that of men. This is accentuated by the fact that women's work propensities and earnings are closely linked to education, and their education increases dramatically as countries grow, while for men labor force participation rates are largely independent of their education; we provide evidence of this in the next chapter. These educational and labor market changes operate to narrow the gender gap in pensions as countries develop. However, lower marriage rates, higher divorce rates, greater longevity (especially for women), hence the reduced relevance of the nuclear family and the breakdown of the extended family, work in the opposite direction to maintain the gender gap. While women are having far fewer children in rich countries, they continue to hold the child-bearing and most of the child-rearing responsibilities, which cuts into the labor market responsibilities. The challenge is: how should social security policy respond to these diverse conditions? Policy choices will ultimately depend on value judgments and trade-offs among objectives, but understanding the variety of options and their consequences are an important input into this process.

Chapter III: How Do We Measure the Impact of Pension Systems and Reforms?

To investigate more precisely the impact of pension design and reform on men and women, we carried out a detailed simulation of the old and new systems in three Latin American countries—Chile, Argentina and Mexico. The old systems in all three countries were pay-as-you-go defined benefit schemes that paid a benefit to workers based on their years of work and average wage during the last few years. Projected revenues were far less than expenditures in these systems so they had to be changed. In addition, inequities, negative impacts on the broader economies and distrust of politically motivated schemes led to a major institutional reform. Chile was the pioneer and other Latin American countries, as well as countries elsewhere, followed suit.

The new systems were multi-pillar schemes that featured a defined contribution plan—individual retirement accounts that were fully funded and privately managed, hence not dependent on government promises. These savings are turned into annuities or other forms of pensions upon retirement. We expect that individual accounts will produce lower own-pensions for women than for men, due to their less continuous employment histories, lower wages, earlier retirement and longer life expectancy. Of course, in pure defined contribution plans the lower pension is directly attributable to lower contributions; in this sense, lower pensions for women might be interpreted as “neutral treatment.” However, it also may signal a very low standard of living for older women, which social security was designed to avoid.

In part to mitigate this effect, all multi-pillar systems contain a publicly managed defined benefit pillar, usually financed by general revenues. These take the form of a minimum pension guarantee (MPG) in Chile, a “social quota” (plus an MPG) in Mexico, and a flat benefit in Argentina. We hypothesize that the public benefits, which have the objective of redistributing to lower income groups, will generate transfer payments that favor women. But detailed arrangements such as degree of targeting to low earners, eligibility rules, retirement age and indexation provisions dictate which women benefit and how much. An important policy question: who should be subsidized by the public pillar and who should be taxed to cover the subsidies?

Multi-pillar reforms in Latin America and elsewhere also contain elaborate restrictions at the payout stage, especially regarding annuitization, which redistribute between the genders. We hypothesize that the common requirement of survivors' benefits and joint annuities will generate an important intra-family redistribution toward women, including women who have not worked in the formal labor market themselves. In most European countries as well as the US, unisex tables are required for employment-related annuities, to help equalize annual pension amounts. This is not yet required in Latin America. We examine the degree to which joint annuities serve as an alternative to unisex tables.

Finally, the new systems replaced traditional systems where contributions and benefits were only loosely linked. The old systems favored women in some ways but hurt them in others; thus the net impact of the change is uncertain a priori. We examine this question empirically.

I. Methodology

Methodological problems

Analysis of how women fare relative to men in the new and old social security systems is difficult for a number of reasons. First, the new systems have not been in effect long enough to be mature. That is, current retirees in Chile and Argentina are subject to a mixture of old and new system benefits and we don't know for sure how someone will fare in the future who is fully under the new system. In Mexico almost everyone has retired under old-system rules, given the short period for building up individual accounts and the option current workers have to revert to the old system upon retirement. Moreover, in all three cases we don't know what the rate of wage growth and rate of return on investments will be in the future, and this determines how rapidly retirement funds will accumulate in the new system. Along similar lines, longitudinal data from the past are not available. Thus, we could not use actual employment histories of current retirees and workers to estimate their new-system benefits. Finally, we do not know what the old system benefits would have been in the future because they were financially unbalanced and had to change.

Construction of representative men and women

We solved some of these problems by constructing synthetic men and women—using cross-sectional data on current behavior of people at different ages, educational levels and marital status to proxy the lifetime employment, wage and contribution histories of “typical” persons in each category. We then simulated how the average man and woman in each category, if entering the labor force today, would eventually fare under the rules of the old and new systems.⁹ While we focus on the average person in each category, we also make some attempt to estimate the dispersion within each cell. Five educational levels are presented, ranging from incomplete primary to several years of post-secondary. The modal group has full secondary education in Chile, incomplete secondary in Argentina and primary education in Mexico (Table 3.1). With the exception of young women in Chile, fewer than a quarter of our sample had any post-secondary education. We use education as a proxy for “permanent income.”

This methodology assumes that age-specific labor force participation and wage behavior will remain constant through time (except for secular wage growth, which we impute), separately for each schooling level. We interpreted these as age effects rather than cohort effects. In reality, cohort effects are undoubtedly involved. Aggregate female labor force participation has been rising and will probably continue to rise through time. This is partly due to rising female education, which is strongly correlated with female labor force attachment, and partly due to changing social norms within each educational category. To the degree that the educational effect dominates, our results in each schooling category will continue to be valid for younger cohorts, although the aggregate will change as more women shift into higher schooling categories.

To investigate this effect we decomposed the total change in aggregate female labor force participation over the past thirty years and found that one-third to one-half was due to increasing education, the remainder to changing work proclivities with a given educational category (see below). If women retain their higher work propensities throughout their lives, young women will end up contributing more than we have projected, even within each schooling category (see below for fuller analysis of this effect). Moreover, work incentives in the new pension systems may alter work habits endogenously in the future. For example, the fact that married women do not have to give

up their own annuity to get the widows benefit increases the old age income of women and may also lead them to work more.

We did not take these potential changes in age-specific female labor force participation rates into account in our simulations. However, in addition to the “average” woman in each educational group, we also calculated pensions for “ten-year women” who worked full time ages 21-30 prior to child-bearing, and “full career women” who had the same labor force participation and retirement age as men. The average woman in older cohorts, who are retiring today, probably looked more like ten-year women while the average woman in younger cohorts will probably look more like “full career woman,” as work proclivities change. The absence of longitudinal data meant that we could not vary wages as a function of experience so the lifetime earnings and pensions of full career women may be understated.

Our representative men and women are assumed to be single until the median age of marriage in each country, and married thereafter. They marry within their educational class, and the average husband is three years older than the wife. We also make some attempt to show the wage and work profiles for single women, but this is difficult because of small sample size of single women in some cells and our inability to distinguish between those who are never-married versus widowed or divorced. The available data suggest that the working time of single women, especially those who never married, is much closer to that of men, and may therefore be approximated by our “full career” women (Table 3.2).¹⁰ Thus, altogether, we model 5 categories of men (by educational grouping) and 15 categories of women—5 educational groups and 3 levels of labor force attachment—and we also make some distinctions between singles and married for each gender. Additionally, at various points we analyze differences among individuals who retire early and late, and individuals with regular and irregular contributory histories—variables which turn out to play an important role in the new systems. (See Appendix for more details about methodology).

Will women’s behavior change through time? How does education affect labor market participation?

Formal labor market participation of women has increased dramatically in recent years in all our countries, while that of men has remained stable. For example, between 1970 and 2000 in Mexico employment rates increased from 23% to 34% among women

age 16-65 and it doubled for ages 26-55. In contrast, employment rates for men were 82.1% in 1970 and 82.9% in 2000. In Chile labor force participation rates among women age 16-65 increased by 25% between 1970 and 2000, and over 35% for ages 26-55, while for men it fell slightly from 84% to 81%. In Argentina women's labor force participation rates doubled between 1975 and 2000 compared with a constant rate of 93-94% for men (Table 3.3). We also notice that labor force participation is much higher among younger than older workers.

This leads to questions about whether the age-specific behavior we observed in our data will persist for women. In creating synthetic cohorts from a single cross-section we treated differences by age as age effects rather than cohort effects. We assumed that the age effects for the year of our surveys would continue as age effects into the future. But in reality the higher labor force participation rates of young female workers may be cohort effects. That is, these young women may stay in the labor force as they age to a much greater extent than their mothers did. If this is the case, we have underestimated the gender ratios of lifetime retirement savings accumulations and pensions. In this section we explore the possible size of this bias in our analysis and how we handled it.

Our hypothesis is that increased education is associated with at least some of the increase in aggregate participation rates, particularly the higher participation rates of young women. More highly educated women are more likely to work in the labor market, while for men participation is much more stable across schooling groups. In general, women's labor market participation is more sensitive to wage incentives than that of men, possibly because women have the socially acceptable alternative of working at home. As women acquire more education, their market value increases; and if their imputed value in the home does not increase as rapidly, a larger percentage will enter the market place. Causation may also run the other way. Having decided that their female as well as male children will work, perhaps because more "acceptable" jobs are available (Goldin 2006) the families of girls may encourage them to get more schooling, realizing that the market rewards education. In either case, the increase in participation rates within each educational category should be less than the aggregate increase and by separating the analysis by educational groups we have limited the size of the potential bias.

Also in either case the part of the aggregate change that is associated with educational shifts should reflect a cohort effect, not simply a temporary age effect. Level of education is a characteristic that people carry with them through life. Thus, if a young woman has more education, she is likely to continue working more as she ages. Women from older cohorts with less education will retire and be replaced with new entrants to the labor force, who will have more education than their predecessors, thereby shifting the entire educational and participation distribution up. In that case, in the aggregate, women will accumulate more years of work and contributions than we have estimated; in effect, we have estimated a lower bound.

A cursory examination of the data are consistent with this hypothesis. Table 3.3 depicts the changes in labor force participation rates by education and in educational shares of the female population between 1970 and 2000 in Chile and Mexico, 1975-2000 in Argentina. In each case, we see that employment rates among women increased over this period for practically every educational category, but the aggregate increase in employment rates was much greater—due to a shift of women into higher educational categories between the 1970's and 2000. For example, in Mexico, the employment rate increased less than 8% in each educational category, but the aggregate increase was 17.5%. In each country, the vast majority of women were in the bottom educational category (incomplete primary) in the early 1970's, but by 2000 the primary share had fallen drastically, the modal share had shifted to secondary, and many women had university degrees. In Mexico formal years of schooling for women doubled between 1970 and 2000. In Chile and Argentina, it increased by 44% and 60%, respectively, with the largest gains in all three cases for those under age 45 (Tables 3.4, 3.5 and 3.6). We see also that, across this entire period, propensities to work in the market were much higher for women who attended secondary school and even more so, for those with higher education.

We seek to determine how much of the over-all change is associated with increased education and how much is left over, indicating a change in work proclivities due to other factors. Our quantitative analysis described below indicates that education “explains” about one-third to one-half of the increase in participation rates in our three

countries. Thus, separating our sample by level of schooling cuts down on the bias substantially, but does not eliminate it.

We use two methods to carry out the decomposition between education and other factors that account for women's increased labor force participation. First, we use a regression approach, based on the standard Oaxaca decomposition (Oaxaca 1973). This approach has the advantage that it allows us to take account of changes in other variables that might be affecting participation (although the only other variable we include in our simple analysis is age as a continuous variable within each age group). The Oaxaca approach decomposes the difference into the effect of changes in the propensity to work within each educational group and the effect of changes in educational composition.¹¹

Secondly, we use a simple accounting method to calculate the two sources of change in aggregate labor force participation (lfpr): First, we assume that the distribution of the population by education (eddistrib) is the same in 2000 as in 1970, but that participation rates increased within each schooling group, as observed. In effect, we weight the change in participation rate of each schooling group by its share of the female population in 1970 to get the predicted aggregate change. This tells us how much the over-all participation rate would have changed if educational composition remained constant but work propensities within each group changed, for other reasons. Next, we assume that the educational distribution of the population changed between 1970 and 2000 as observed, but that the participation rates of 1970 continued to apply for each educational group (lfpr_i). In effect, we weight the change in educational levels by the 1970 participation rate of each level to get the predicted aggregate change. This tells us how much the aggregate participation rate would have changed if educational levels shifted but work propensities within each schooling category were unchanged. The over-all change in participation rates is the sum of these two components plus an interaction term. Formally:

$$\Delta lfpr = \sum \Delta lfpr_i * 1970eddistrib + \sum \Delta eddistrib * 1970lfpr_i + \sum \Delta lfpr_i * \Delta eddistrib_i$$

summed over all educational categories, i.

Not surprisingly, since we did not add many variables in the Oaxaca approach, we get similar results in the accounting decomposition.

Tables 3.4, 3.5 and 3.6 report the results of these decomposition exercises for our three countries. For Mexico, we use employment of women instead of labor force participation. We see that for prime age groups 25-55 the increased employment of women is due about equally to both forces—greater education and greater propensity to work within a given educational category.¹² This suggests that employment rates within educational categories, on which we base our analysis, will be much more stable than the aggregate, but in the aggregate we will still understate future employment and contributions by young women so long as they retain their higher work propensities. For Chile, schooling shifts played the major role for ages 26-45, while changes in work propensities dominate for the older age groups. This again suggests that we have eliminated much of the problem for younger women when we disaggregate by education.¹³ In Argentina where labor force participation of women doubled, only about one-third of the increase was due to a shift in educational composition, so a substantial increase in work propensities remains when we disaggregate by education.

Although we interpret the impact of the change in educational composition as exerting a cohort effect in the aggregate, we don't attempt in this study to explain the other half of the story--the increase changes in work propensities within each educational category. We suspect that this too is, at least in part, a cohort effect, stemming from changes in social norms regarding work versus child-bearing. The dramatic decline in fertility rates among young women probably signals that they will stay in the labor force as they age, so our synthetic work histories within educational categories understate the actual years of employment and contributions that they will accumulate. (Also see Duryea, Edwards and Ureta 2005 for a related analysis across a larger number of Latin American countries).¹⁴

Our conclusion: it is likely that younger women today will continue to work more than their mothers and grandmothers did, partly as a result of increased education and partly because of social norms that increase work propensities of females. This trend toward higher labor force participation will continue as educational levels continue to rise. Our simulation results for women with primary school education will become a much less important part of the total picture, and those for secondary and post-secondary levels will dominate. Therefore, the over-all “average” women among younger cohorts

will be in a different schooling group and have a higher accumulation of work years and retirement savings than we have estimated. She will be closer to the full career woman.

Consequently, female/male pension ratios will be higher than we have estimated on the basis of these cross-sectional data. This is partly due to the greater accumulations in women's own accounts and partly to their greater access to the public benefit, which often ties eligibility to years of work. As we shall see, the new pension systems tend to reward work more than the old systems, especially in Mexico and Chile, so this cohort change should improve the gains to women from the reform.

Data

In constructing our synthetic men and women, we used national data sets for urban areas (see Appendix). The “average person” in these countries is quite different from the “average person in the social security system” and we are primarily interested in the latter. We focus on urban workers, because social security coverage in rural areas is very limited; men and women in these areas are still heavily dependent on the extended family system. (Urban is only a rough proxy for coverage as some social security affiliates live in rural areas while some urban residents are not covered by social security). In Chile our data cover only those affiliated to social security, which means they were in the system at some points in their lives. In Argentina and Mexico, all urban workers are included in our sample. This difference in sample helps explain why the labor force participation rates of women appear to be higher in Chile. Also in Chile the wage and work data primarily cover full time workers while in Argentina and Mexico they cover full time plus part time workers. Part time workers are predominantly women, low paid and often do not contribute to social security. Both these factors suggest that our data may understate wages and work of women who were covered by social security and therefore overstate the pension gender differential in Argentina and Mexico. At the same time, they also remind us that many workers are not in the system at all, and these are probably disproportionately women.

Contributing time versus working time: density of contributions

Our cross-sectional data for Chile give us direct information about actual contributing time of affiliates, and recently longitudinal data have become available whose implications are roughly consistent. Affiliates contribute about 80% of the time

that they work, in Chile. Our data for Argentina and Mexico give us working years, but this may be quite different from the proportion of time these workers actually contribute. In many low and middle income countries the density of contributions—the proportion of potential working time that affiliates contribute—is quite low, because many affiliates spend considerable time as unemployed, self-employed or in the informal sector, where contributions are not required or where governments cannot enforce the requirements. This seems to be the case for Argentina and Mexico (see Arenas et al 2004 and 2006; Berstein et al 2005; Bertranou and Sanchez 2003). Therefore, for Argentina and Mexico, where we do not have direct data on contributory histories among affiliates of the social security system, we simulate outcomes for workers who generally contribute when they work and we also show results for “low density” workers who contribute only 60% of the time that they work.

While the available data are quite incomplete, they indicate that gender differences in density of contributions are not large, once working time is controlled. Thus, density of contributions while working does not have a large impact on relative private pensions between working men and women. However, a large proportion of women, especially women with low education, do not engage in formal labor market work, and this, of course, influences their access to contributory pensions. Both work propensities and density of contributions while working also play a role in determining the absolute size of the pension and eligibility conditions for the public benefit, both for men and women.

Assumptions for simulations

In Chapters 4, 5 and 6 we use these employment histories to simulate the accumulations, private pensions and public benefits that different groups of men and women can expect under the new systems. Accumulations and pensions in defined contribution plans are very sensitive to rates of return on investments and rates of wage growth. In our baseline simulations, we assume a “moderate growth” scenario in which economy-wide real wage growth is 2% per year and the real net rate of return is 5% prior to retirement. The return during the payout stage is assumed to be 3.5%, given the likelihood that many will choose a low risk or fixed rate annuity which pays a lower return (see James and Song 2001; James, Song and Vittas 2001; James, Martinez and

Iglesias 2006). (In reality, average annual rates of return exceeded 9% real in the early years in all three countries, although this is not expected to continue in the long run). Sensitivity analyses assuming a 3% real rate of return during the accumulation stage, 1.5% during the payout stage and a 0 rate of wage growth were also carried out. The gender implications of this “slow growth” case were very similar to the baseline, except that the relative role of the public benefit increases dramatically, especially in Chile.

Some evidence from the US and other countries indicates that women may choose more risk-averse portfolios with lower expected rates of return than men, in which case their accumulations and pensions would end up lower. However, in Latin America regulations and limited financial markets have meant that workers, in fact, have had little portfolio choice. They can choose asset manager but all managers offer very similar portfolios. Thus, there has been little opportunity for gender differences in portfolio risk and return. This may change in the future as Chile in 2002 started allowing differentiated portfolios and other countries may follow suit. It is likely to be an issue in the U.S. Here we simply note that even in the U.S. this observed gender differential is reduced once earnings differentials are controlled and may disappear once women acquire more financial experience. Moreover, the differential return would be much smaller if measured in risk-adjusted terms. That is, women may get lower expected returns but for the same reason they face lower financial market risk and may fare better than men if rates of return drop unexpectedly. In this analysis we abstract from gender differences in response to financial market risk in the new systems and political risk in the old systems.¹⁵

Administrative fees could reduce these returns. In the case of Chile, these fees are paid for out of an additional contribution, set by each pension fund, beyond the mandatory amount that goes into the account. Thus they do not enter into our simulations of accumulations from the mandatory contributions. In Mexico and Argentina they are subtracted from the mandatory contribution, which leaves less for the accounts in our simulations. In absolute amount, fees per account have been increasing slowly over time, but relative to wages and assets they have been falling and likely will continue to do so due to scale economies and competition. In our simulations, we use the fees that were in effect in the late 1990's, which overestimates future fees and underestimates the eventual

accumulations and pensions of young workers today. However, since this affects both men and women proportionately, this should have little impact on gender ratios, upon which we focus. In subsequent chapters we provide more detailed information, relevant to each country.

Although both gradual withdrawals and annuities are permitted at the payout stage, to impute a stable annual flow for purposes of this analysis we assume that these accumulations are fully annuitized upon retirement. For transforming the accumulations into annuities, we apply the World Bank mortality tables for the cohort retiring in 2040 for each country. These tables build in projected improvements in life expectancy so they yield a smaller annuity than today's mortality tables would. This affects the annuity size but not the gender ratios, so long as projected improvements are proportional for both sexes. Life expectancies are differentiated by gender, except in the sections and tables that deal with the unisex issue. We know that, in general, mortality rates are highly correlated with income and education, but we have no data that allow us to make this differentiation in our three countries. Thus, our results probably understate the ratio of lifetime annuities between high and low earners, and overstate the redistributive impact of the public benefits. Men and women are assumed to annuitize at the normal retirement age that is specified in each country—lower for women than for men in Chile and Argentina—but we also explore the impact of early retirement, which is common. We pay particular attention to the influence of type of annuity, especially the joint annuity, which is required for married men. For the case of Chile we compare the results of these simulations with data based on actual experience of the new system during the twenty-five years of its existence. Chile is the only country whose new system is old enough to have a substantial body of pensioners.

Present value of costs, benefits and redistributions

While we start by comparing monthly benefits, for the analysis of transfers and systemic change we shift to a comparison of lifetime benefits, since retirement age and age of death vary by gender, country and as a result of the reform, and benefits from the joint annuity start flowing to widows late in old age. We convert expected monthly flows into expected present values at age 65 (EPV) using the same rate as was assumed for

annuity calculations—3.5% for the baseline and 1.5% for the slow growth case. (We do not calculate risk-adjusted EPV, as risk-return trade-offs may vary across individuals).

We know each person's contribution to the individual account. However, often we don't know the future cost of the public benefit, its intergenerational burden or its gender incidence, since this is financed, in whole or part, out of general revenues. Our analysis of net redistributions (gross benefits minus taxes) is a rough approximation based on the simplifying assumptions that each cohort covers its own bill and, within each cohort, the tax burden is distributed proportionally to lifetime earnings as proxied by lifetime annuities from the worker's own retirement accumulation.

II. Comparisons of New and Old Systems

The counterfactual for system comparisons: emphasis on relative positions

While most of this monograph is about the gender impact of the new systems, in Chapters 4-6 we compare the new versus the old systems. This introduces an additional set of methodological problems. The old systems were financially unbalanced, with future expected revenues less than future obligations, so could not have delivered their promised benefits in the long or medium term. Argentina was already defaulting on its payments. We can't compare the new system with a non-sustainable old system. What, then, is the counterfactual? Whose benefits would have been cut or whose taxes increased to make the old system solvent? We avoid this problem by focusing on relative rather than absolute gains and losses to different gender-education-marital groups. We ask: Which groups gained or lost in relative position due to the reform? Did gender ratios improve or deteriorate? Implicitly, this means the counterfactual is any new system that corrects the fiscal imbalance in the old systems in a distributionally neutral way. This involves equi-proportional benefit cuts or tax increases for each group, while leaving relative positions unchanged. Essentially, we are comparing the actual reform with some other potential reform in which each group retains the same relative position that it had in the old system.¹⁶

Even this is sometimes difficult to define, since the old systems were fragmented—different rules applied to different occupations and these rules often

changed or were unevenly implemented, due to political and fiscal pressures. In each chapter we describe the system that we are using as the counterfactual, which generally is the main system that existed just prior to the reform. The new systems, too, have been undergoing change. In each chapter we describe the system that we use for our main analysis, which generally is the initial reformed system. We also analyze rule changes and behaviors that are likely to have an important gender impact—for example, the tendency of men to retire early in Chile and the eased eligibility requirement for the public benefit in Argentina. It turns out that these adaptations generally tend to equalize pensions between the genders. While we are, to some extent, chasing a moving target, all these variations fortunately advance the most important part of the analysis, which ties design features to gender outcomes.

How did the old systems treat women?

In general, the old systems provided a benefit of the following sort:

$$B = aYS, \text{ where:}$$

B = annual pension benefits,

a = incremental benefit per year of work,

Y = number of contributory years,

S = average salary during last few years of work.

This formula provided a generous benefit for women who worked for only a short time and then withdrew from the labor market, because a was often very high for the first ten years of work. In all three countries, the first 10-20 years of contributions seemingly produced a high benefit rate. Women were more likely than men to work for 10-20 years and then leave the formal labor market. Married women got a widow's benefit that was 50% of their husband's pension in Chile, 75% in Argentina and 90% in Mexico. Implicitly, unisex tables were used. Women could retire five years earlier than men with no actuarial penalty in Chile and Argentina.

In contrast to these provisions that favored women, the old systems based their benefits on the last few working years, which favored men. A woman who worked at ages 20-30, before child-bearing, would earn no interest on her contributions and would find her pension based on wages that would appear to be very low compared with prevailing wages when she retired at age 60-65. In addition, using final year's salary as

the reference wage especially favored workers with steep age-earnings profiles, who tended to be highly educated men. For example, a Chilean woman with secondary education who worked ages 21-30 would have had a pensionable wage base of US\$205 while her male counterpart who continued working to ages 55-65 would have had a pensionable wage base of US\$375 with 0 economy-wide wage growth or \$750 with 2% wage growth. Thus, his base salary would have been 2-4 times as great as hers.¹⁷ In contrast, under the new system, with her contributions earning a 5% real rate of return, they would have quadrupled over this period, greatly narrowing the gender pension gap.

Furthermore, as already mentioned, in Chile and parts of the Argentine system women had to give up their own pension to get the widow's pension, so women who worked much of their lives in the labor market got little or no incremental benefit. Their contribution was a pure tax—a tax that cut their lifetime income and may have deterred them from working. If they had been allowed them to keep both benefits, it would have greatly increased the costs and insolvency of the old systems. Under the new systems, women get both, but without imposing a double cost on the common pool.

The reforms eliminated all the biases mentioned above—both those that helped and hurt women. We evaluate whether, on balance, this made women better or worse off.

Inflation

In our calculations we abstract from inflation and deal only in real interest rates and wage growth. Yet, in reality these countries had very high levels of inflation and how they treated inflation determined the welfare of all workers, but especially women. For example, pensions in the old systems were based on past wages that were usually not indexed up for inflation. This especially hurt women, who often had worked many years in the past before child-bearing, at wage rates that became worthless after inflation. Once a person retired, the initial benefit was usually not automatically indexed for inflation. Ad hoc adjustments were made, but they were uncertain, partial and lagged. This created problems for all workers, but particularly for women, because of their greater longevity. However, some systems included a minimum pension that roughly kept pace with the price level. Low earning women would have benefited disproportionately from such a minimum, while high earning men may have found their pensions dwindling in real terms over time.

In the new systems, contributions made to the funded plan early in one's career are likely to rise faster than inflation because of the positive real rate of return on investments, Chile's annuities are indexed after retirement, and Mexico's public benefit is indexed. Chile's minimum pension guarantee formally rises with the price level, but actually has been rising faster than prices, as a result of political decisions. We abstract from inflation because of its uneven nature and the unpredictable ad hoc responses that were made by the old systems. This is equivalent to assuming zero inflation or full indexation in the old systems, and biases our results against the new systems. (For details of the old and new systems see Tables 4.1, 5.1 and 6.1. For basic demographic and economic information about Chile, Argentina and Mexico, see Table 3.7).

IV. What are the Gender Indicators?

The many dimensions of gender equality and inequality

We use several alternative gender indicators in this analysis, since each tells us something different about the relative position of men and women. For all the reasons we have just given, we expect *monthly own-annuities* of women in the new systems to be much less than those of men. This measure tells us how much income men and women have from their own retirement savings, to live on in old age. The differential will be somewhat smaller, but still quite substantial, when we add the public benefit. This measure tells us how much income men and women have from both the public and private pillars. The gender gap becomes much smaller when we calculate the *present value of lifetime income*, because women live longer than men, often they are permitted to retire earlier than men, and hence collect benefits for more years. The lifetime pension captures these extra years. Additionally, this measure includes widow's benefits and joint annuities, which provide a major boost for married women and often equalizes lifetime incomes for men and women.

We expect the male/female differential to become much smaller and possibly to disappear when we discuss the *replacement rate* (i.e. pension/reference wage), which tells how much of the worker's wage is replaced by the pension. This indicator tells us the degree to which men and women will be able to maintain their previous standard of

living after retirement. In discussions of replacement rate the reference wage in the denominator is sometimes final year salary and sometimes average annual earnings over some longer period, such as the last five years or the worker's entire lifetime. We present two different estimates of replacement rates, based on two different concepts of the reference wage: 1) the average monthly full-time wage during ages 51-55, since after age 55 our data are biased by the selection of workers into early retirement; and 2) the average amount earned during ages 51-55, which equals monthly full time wage times the proportion of time the average individual actually worked during that same age interval. We would expect men to have a higher monthly pension relative to monthly full time salary than women, since men have worked and contributed much longer to build their pensions. But the monthly pension relative to average amount earned may be very similar for men and women, since the most important sources of differentials (wage rate and time worked) have been controlled and reduced the denominator of this ratio for women.

In contrast to the indicators just discussed, *pension redistributions*, which compare lifetime benefits with lifetime contributions or taxes paid, are likely to be positive for women and negative for men—due to the targeted public benefit and the joint pension that is often required. (Implicitly this also means that the average female rate of return on contributions and taxes that finance the new systems is greater than that for men). This measure tell us how much income is transferred to women from others in the mandatory system, to augment their monthly and lifetime benefits.

Does the individual or the household unit matter?

Finally, our analysis is based on the assumption that the individual recipient of benefits and payer of taxes matters. If we had hypothesized, instead, that all family income goes into a big family pot and all family expenditure come out of that pot, regardless of the identity of the earner or spender, gender policies would matter much less, because the welfare of men and women would depend on household resources rather than individual resources. To some extent, families do share incomes and costs of living. Many spouses take into account the current and future needs of their partners and many old people live in extended family arrangements with their children. Nevertheless, in some marriages the distribution of consumption is unbalanced between the participants and depends in part on the income that each brings to the table. Even if both spouses care

about the welfare of the other, each one may plan and care primarily about his or her lifetime. Since husbands, on average, die before their wives, this may leave many widows in a difficult financial position. Myopia may deter sufficient saving and insurance both for men and women, but older women are likely to be the ones left after the household savings have run out.

In all these cases, and particularly as they grow very old, the public and private pension entitlements of men and women as individuals becomes important in determining their relative standards of living and the incidence of poverty between them. Moreover, it matters for women who are divorced or who never married--a group that is growing in relative size in most countries. This analysis hopes to throw light on outcomes that might be considered desirable and on policies that will help achieve those outcomes.

Chapter 4: Chile

In 1981 Chile replaced a mature traditional government-run pay-as-you-go defined benefit system with a new multi-pillar system that included a defined contribution plan along with a public benefit in the form of a minimum pension guarantee (supplemented by a means-tested social assistance benefit for those outside the contributory system). The old system was insolvent, having promised benefits that increasingly exceeded contributions. Many workers and employers evaded the payroll tax, exacerbating the fiscal problem. The object of the reform was to make the system largely funded and therefore fiscally sustainable; to link benefits more closely to contributions thereby reducing the tax element and the vulnerability of the system's finances to evasion; and to make the redistributive element explicit and targeted. The potentially divergent impacts on the two genders was not a big factor in the policy choice but it is a bigger factor in the present reevaluation. In this chapter we analyze whether women were helped or hurt by this reform.

In a nutshell we found: From their own retirement accounts women receive lower annual pensions than men, due to their less continuous employment histories, lower wages, and earlier age of retirement. We would expect this result in any contribution-based scheme. However, this outcome is modified by transfers that occur within the household--married men are required to provide joint pensions that also cover their widows--and by the minimum pension guarantee (MPG) that is funded from general tax funds. The net outcome: the gap in lifetime retirement income between men and women is smaller in the new system than the old. Moreover, the new scheme contains incentives that encourage women to participate in the labor market and build their own pensions. The biggest gainers are full career women, who work as much as men.

On the other side of the ledger, the earlier allowable retirement age for women cuts their pensions substantially. Pensions would be more equal if retirement ages were equalized. The MPG discourages marginal work by low earning women once they meet the 20-year eligibility requirement and leaves women who fail to reach the 20-year point unprotected aside from social assistance. These undesirable effects could be eliminated by making the MPG proportional to years worked. Thus, the new system improves the

relative position of women, but further modifications would improve their positions still further, while also encouraging them to work and contribute to economy

I. The Old and New Systems and Our Data for Comparing Them

The old system

The old Chilean system had a 26% contribution rate and a typical defined benefit formula: the annual pension benefit = 50% of the reference wage for the first ten years of work and 1% per year thereafter, up to a maximum of 70%.¹⁸ Workers who contributed for less than ten years got nothing, but those who contributed 10 years got a high replacement rate due to the high accrual rate for the first ten years. Most of these short-term workers were women. A minimum benefit applied after twenty years of work. The pensionable salary was the average of the last 5 years' salary, of which the last 3 years were indexed up for inflation. Women whose work was done many years earlier, prior to child-bearing, had a low reference wage base and a low pension relative to contemporary wages, due both to inflation and real wage growth in the interim. After retirement the initial benefit was not indexed for inflation, although the inflation rate was high. Ad hoc adjustment usually lagged the actual inflationary process. Married women whose husbands were in the system were entitled to a widow's benefit that was 50% of their husband's pension--but they had to give up their own pension to get it. This benefited women who didn't work in the labor market, but those who did work got no incremental benefit for their contributions. Men could retire at 65 and women at age 60 with no actuarial penalty.

The new system

Chile's new system was a multi-pillar system that included a defined contribution plan (an individual account for each worker), buttressed by a public benefit in the form of a minimum pension guarantee (MPG). Mandatory payroll contributions are paid to private investment managing companies (AFP's) that compete for worker-affiliates, rather than to a public fund. These contributions are 10% of payroll for investment plus 2.5% for administrative fees and requisite premiums for disability and survivors insurance.¹⁹ Normal retirement age is 65 for men and 60 for women. Upon retirement,

workers can draw upon their accumulated savings in the form of gradual withdrawals that are spread over both spouses' lifetimes or an annuity that must be joint for married men. However, workers are allowed to stop contributing and start withdrawing their money whenever they meet the early retirement pre-conditions. Until recently they could do so as soon as their accounts are large enough to purchase a pension that was 110% of the MPG and 50% of their average wage. These requirements are now scheduled to rise to 150% of the MPG and 70% of own-wage. Both these conditions are more easily met by high earners, especially men. All medium and long-term financial transactions, including annuities, are price-indexed in Chile, and many indexed instruments are traded.

Those who have contributed for at least 20 years are guaranteed a minimum pension (MPG). If the pension from the worker's private retirement savings does not reach the MPG level, the government provides a subsidy. For retirees who have annuitized, the government tops up the annuity to the MPG level. For retirees who have taken a gradual withdrawal, the individual must withdraw the minimum pension from his or her account until it is exhausted, at which point the state pays the whole minimum pension thereafter. This public benefit is financed from general revenues. Qualification for the MPG is based purely on the individual's own income and does not take other family income into account. (For a summary of the old and new systems see Table 4.1).

At the date of the reform, affiliation with the new system became mandatory for new employees in the formal labor force, and voluntary but encouraged for employees already in the labor force.²⁰ Self-employed workers have the option to affiliate and pay contributions voluntarily, and about 25% of them do so (Table 4.2). Among all Chilean workers in our sample, 70% of men and 65% of women contributed in 1994. This difference is not large. However, half the working age women were not working in the formal market or contributing.

Chile also offers a non-contributory social assistance program called PASIS, which pays about 50% of the MPG, financed out of general revenues. This is designed to keep out of poverty the elderly who are not eligible for contributory benefits. The number of eligible applicants exceeds the available money, so a long waiting list has developed. In this study we mainly analyze the contributory scheme, but it is important to be aware that many old people are not covered by it and a modest non-contributory scheme also

exists. The vast majority of its recipients are women living in rural areas. In Chapter 8 we discuss the possible role of non-contributory schemes in providing support for older women.

Data

To investigate the impact of pension reform on men and women, we simulate pension benefits under the old and new systems. Data on contributions are an essential component of our simulations. However, longitudinal information on individual contributions is not available. Instead, we use cross-sectional data from household surveys to build a series of synthetic cohorts and project life-cycle contributions of “typical” individuals. Our key data source is the Caracterización Socioeconómica Nacional (CASEN) for 1994, a national household survey carried out by the National Planning Office. This survey collects information on a variety of indicators, including demographic characteristics, labor force participation, earnings, affiliation to social security, and the answer to the question “Are you currently a contributor to any of the social security systems?” Responses to the questions on affiliation and contributions, and their relationship to employment status, are presented in Table 4.2. We use observed work and earnings patterns by age in this survey to project contributions of an “average” 20-year-old into the future (Tables 4.3 and 4.4).

The previous chapter discussed some of the pitfalls of this methodology. In particular, young women today are unlikely to behave as their predecessors did, particularly regarding labor force participation. One key factor driving this generational change is that younger cohorts have more schooling and women with more schooling have more continuous work experience. For example, in the Greater Santiago area among women born between 1926 and 1930, 56% had 6 years or less of schooling, while this proportion had fallen to 8% for the cohorts born between 1961 and 1965 (authors’ calculations from University of Chile household surveys). Therefore we divided the 1994 urban sample into five schooling categories: incomplete primary, incomplete secondary, complete secondary, up to four years of post-secondary, and more than four years of post-secondary. We measure the labor force participation of each group, assuming that the pattern within each educational group will be more stable over time than is the aggregate pattern.

In these calculations, we assume that individuals are single until the median age of marriage in Chile, after which they are married. Comparisons with working patterns for individuals who remained single indicate that they work twice as much as married women at the primary and secondary levels, but married women tend to catch up at the university level (Table 3.2). Chile is still a very traditional society where most women marry. An attempt to build participation patterns of singles left us with small sample sizes in some age-educational cells, so we carried out our analysis with the married patterns.

To capture the impact on pensions of the heterogeneity among women in labor force participation, we simulate our results for 3 types of women:

- 1) “average women,” who work at the average rate for females of their age;
- 2) “full career women,” who adopt the labor force patterns of men, including a later retirement age; and
- 3) “ten-year women,” who work full time ages 21-30 prior to child-bearing and then withdraw permanently from the labor force.

Our simulations for ten-year women probably apply to older cohorts, who are retiring today. Our simulations for full career women may apply to younger cohorts today, especially those with more education, and to the small group of single women. We focus on urban workers, because social security coverage in rural areas is very limited, both for men and women. Many women in rural areas receive support from the social assistance pension, PASIS.

Years of work and contribution among affiliates

Affiliation is necessary to contribute and obtain benefits and once a person affiliates to the system he or she remains affiliated for life. In 1994, 67 percent of men and 39 percent of women in the working-age population were affiliated with the system, meaning that they were current contributors or had contributed at some point in the past. Affiliation is required for formal sector employees, who comprise about two-thirds of urban workers. Of this group, 89 percent were affiliates and 95% of the working affiliates make contributions—evidence of high compliance, among both men and women. Of course, it is possible that some services are purchased on an independent contractual basis to avoid the contribution requirement, just as independent contracting has grown in many industrialized countries to avoid payroll taxes and fringe benefits.

Given this possibility, it is interesting to note that many self-employed workers make voluntary contributions to the pension system, even though they are not required to do so. Over one-third of the self-employed are affiliates, and among those affiliated, almost two-thirds contribute (Table 4.2). They may do so, for example, in order to acquire 20 years of contributions and become eligible for the minimum pension guarantee. By the same token, once employees have reached the 20-year point they may be able to escape further contributions if they can switch their status to self-employed. We return to this issue below in our discussion of the MPG.

We confine our sample to affiliates of the system. That is, our results apply to those who worked in the formal market and belonged to the social security system. This gives us a better estimate of the pension acquired by individuals who were in the system, but it overestimates the work experience of the average individual in the population as a whole, and this overestimate is greater for women, who are less likely to work in the formal market and become affiliates.

Among affiliates, we calculate the average fraction of men and women who are contributing workers in each 5-year age cell, and use this to estimate the “average years of contributions” within that age group. Men typically accumulate about 38 years of contributions between ages 16 and 65. Women, especially women in the lower schooling categories, tend to have more interruptions and normal retirement occurs at age 60. As a result, an average woman who completes secondary school accumulates only 26 years of contributions, and at the incomplete primary level only 23 years of contributions, by the time she is eligible to retire at age 60 (Table 4.3). However, a university graduate accumulates 35 years, almost as much as men.

We also calculate the “density of contributions,” which we define here as the number of years worked divided by the potential years of work between age 16 and normal retirement age. Male affiliates have an average density of 77%, while for women this varies from 50% at the primary level to 77% for university graduates. Women affiliates have fewer potential years (because of their earlier retirement) and they contribute for a smaller proportion of these potential years. In addition, a larger proportion of women never affiliated with the formal system in the past, although that may be changing for younger cohorts.

Earnings

We estimate monthly wages by age, sex, and schooling, based on a sample that includes all full time workers whether contributing or not, in an attempt to keep it as large as possible. This is appropriate because the data show no significant correlation between wage levels and affiliation or contribution probabilities. Again, we calculate an average wage for each sex, age, schooling cell (Table 4.4).²¹ The resulting age-wage profiles that we build show how full time wages rise with age and experience for each gender and educational level. This increase occurs through the lifetime of the average person, apart from any economy-wide wage growth. The economy-wide growth that we assume in our simulations raise earnings further, for all age groups, as time moves on.

Based on these cross-sectional data, it appears that earnings-experience profiles in Chile have a concave shape: earnings grow fastest at the earlier stage of careers, more slowly after age 40, and often peak for men around age 50 (for women a bit later). The female/male full time wage ratio for most cells is 60-80%, falling with age, as women's age-earnings profiles are flatter than men's. The lowest gender ratio is for people with five or more years of post-secondary schooling. Although this group of women works almost as much as men, their wage rates are only half as much; women's returns to higher education are much lower than that for men.

II. How Women Fare--accumulations and pensions from their own accounts

How much do men and women accumulate?

We assume that workers in a given schooling and gender category contribute 10 percent of their wages, as required by law. Wage rates for each age are equal to the average value for the corresponding five-year age group. For our baseline scenario we add an economy-wide real wage growth rate of 2% per year, which is roughly similar to Chile's experience during the last 25 years and projections for the future. This is in addition to the age-earnings wage growth implied by our wage data. The two together add up to an annual growth rate above inflation of approximately 4% per year for the average male, as he gains work experience and the economy grows. We further assume the real interest rate is 5% during the accumulation stage, 3.5% during the annuitization

stage. This is far less than the actual rate of return that accounts have received in the new system, exceeding 10% above inflation per year; but it is closer to assumptions that are usually made for long run returns to a mixed investment portfolio of stocks and bonds. We also estimate a “slow growth” scenario, where economy-wide real wage growth is 0 and real interest rates are 3% and 1.5%, respectively. The accumulated pension savings for each gender-education group at point of retirement depends on these assumptions, the work histories of the group, and the retirement age. Since all AFP’s followed very similar investment strategies, participants had practically no choice over portfolios (at least until the system was modified in 2002) so gender differences did not arise as a result of different rates of return and risk-return trade-offs that may exist between men and women.

Table 4.5 reports simulated fund accumulations for men and the 3 types of women described above and Figure 1A compares gender ratios. The first thing to note is that women have substantial funds in their own name—which may be the first time this happened to many of them. An average woman retires at age 60 with a savings account of \$11,700 to \$87,400, depending on educational level (all values given are in 2002 US \$’s) (row 2). Of course, these accumulations are much smaller than those of men, as a result of their lower wage rates and labor force attachment. Estimated funds for the average woman are 35-49 percent of male funds (row 8). If these women postpone retirement to age 65 the additional interest earned would allow their funds to grow by about 30% (row 3 vs. 2). Full career women, who have the same labor force attachment as men and retire at 65 accumulate about 70% as much as men (rows 4 and 10). The incremental effect of postponed retirement is most significant among the least educated women, who work the least in the baseline “average” scenario (column 1). The remaining gender gap in fund accumulations is due to the wage rate differential and it is the largest among the most highly educated women, where the wage differential is greatest (column 5). Of course, women who contribute for just ten years accumulate much less than any other group--only 15-20% percent as much as the average man (rows 1 and 8).

Expected pension benefits

We now proceed to estimate the pensions that men and women derive from these accumulations. Chilean law allows a choice between “programmed withdrawals” and

annuities. For programmed withdrawals the retiree continues to invest the money and takes a scheduled amount out each month, according to a formula that is set by the regulator. For annuities, the retiree turns the entire accumulation over to an insurance company that provides investment and longevity insurance in the form of a guaranteed monthly payout. Over two-thirds of all retirees have chosen to annuitize. The price for the annuity is determined in the market but prior analysis has shown that insurance companies return the entire accumulation to annuitants, when future payouts are discounted at the risk-free rate of return, which roughly corresponds to our 3.5% assumed rate (James and Vittas 2001; James and Song 2002, James, Martinez and Iglesias 2006). Insurance companies are permitted to use gender-specific tables with different survival tables for men and women. To simplify the exposition we assume that the entire accumulation is annuitized.

Chilean law requires a married man to purchase a joint annuity (or joint programmed withdrawal) that covers a pension for his widow at a level at least 60% as great as his own pension. The law does not require or even allow a married woman to provide for her surviving husband, unless he is handicapped. To calculate the payouts this produces, we assume (based on CASEN data) that the average man is married to a woman three years younger than he is, and in the same educational category. He retires at the normal retirement age of 65 and purchases a joint annuity based on his own and wife's expected lifetimes—the full benefit for him and 60% to the widow after his death. A single man purchases an individual annuity, as does an average woman who retires at her normal retirement age of 60. Therefore, even if men and women started with the same fund accumulation at their “normal” retirement age, a woman's own-annuity would necessarily be smaller than the own-annuity of a man, because of her earlier retirement and greater longevity.

In comparing annuity estimates for married men and women, seven results stand out (Table 4.6): First, individual annuities for the average female are about one-third of the corresponding joint annuity purchased by males at the normal retirement age (row 7). The gender differential in annuities is larger than the accumulation differential because of the earlier retirement age of women--the same accumulation has to last longer.

Second, once retirement age for women is raised to 65, the monthly pension rises by almost 50% and the gender ratio rises 47-65%, depending on education (row 8). Clearly, differences in retirement age play a major role in explaining pension differentials. If policy-makers are anxious to increase the monetary incomes of older women, raising their normal retirement age to equality with that of men would seem to be an effective way to accomplish that. Of course, their higher income would come at the price of less retirement leisure than they had before—but still more than men have, given their greater longevity.

Third, if men and women both retire at age 60, the gender ratios of pensions are very similar to the ratios at 65—48-68% (row 11; also see James, Martinez and Iglesias 2006). This is important because the majority of men take advantage of the early retirement provisions and start their pension before age 65 and even below 60. A smaller percentage of women start their pension before the normal age of 60. Thus, even though the “normal” retirement age on paper is five years lower for women, in reality the average retirement age is more similar for both genders. We return to these results later, when comparing our predictions with emerging reality.

Fourth, these differentials are reduced as schooling rises, but then increase again for the most highly educated women (rows 7 and 8). This is because labor force attachment rises with education but the most educated women face the largest wage differential compared with their male counterparts.

Fifth, the gender gap is reduced considerably for women who adopt the labor force participation patterns of men. But even for full career women, a pension gap of 25-30% remains for most groups due to the wage gap, and the pension gap is largest for the women with the most education, where the wage gap is greatest (row 9).

Sixth, women with less than 10 years of accumulated contributions receive a small annuity, as against no benefit at all in the old system (row 10). Finally, the differential between workers at the top and bottom of the educational spectrum is greater than the differential between men and women—workers with primary education get only 14% as much as those with a university degree (rows 1 and 3).

III. The Minimum Pension Guarantee

Who gets it?

The MPG in 1994 was equivalent to \$78 (2002 US\$) per month, which was about 27% of the average male wage, 37% of the average female wage and 125% of the poverty line (currently about 170% of the poverty line). Older retirees got more—an additional 9% at age 70, and more recently, another 5% was added at age 75. The MPG was supposedly linked to prices—moving together with the price index. This means it would stay at this real level indefinitely, rising only enough to compensate for price increases. This is far below the estimated own-annuity for all male groups and all but one of the female groups. Only women in the bottom education group fall below the MPG level, and they receive a top-up that adds about 31% to their own annuity (Table 4.7, row 6 and Figure 2A).²²

Thus, the MPG truncates the pension distribution at the bottom end, the bottom end is mainly composed of women, and this raises the female/male ratio of pensions at the primary educational level by a modest amount. However, only 25% of our sample falls into this educational category, and the percentage falls to only 9% for younger cohorts. Obviously the proportion of women whose own-pension puts them below a price-indexed MPG is slated to fall dramatically through time, as more women get higher education and their real wages rise.

The MPG has no impact on women with more education—it is narrowly targeted toward women with the lowest lifetime earnings. But some of these low earning women probably live in households with substantial family income. This raises the policy questions: should subsidies depend on individual income or family income? And, should measures be taken to bring women in the middle educational categories toward greater equality with men? We return to these issues in a later chapter.²³

Disincentive to marginal work *or* insurance against partial careers

If the average woman with least education postponed withdrawing her retirement savings until age 65, her own-annuity would be \$88, higher than the MPG level. If she worked full career she would become even less eligible for subsidy. By working beyond the 20 years required for eligibility she is simply substituting her own contributions and annuity for the MPG. This is similar to the high marginal tax rate that we encounter in

many means-tested programs—a subsidy to those least well off becomes an implicit tax on those who manage to raise themselves above the threshold. Low earning women face a strong incentive to work up to the 20-year point to become eligible for the MPG, but a strong disincentive to work beyond 20 years or to postpone retirement. The MPG may have a negative impact on their marginal labor supply and on the likelihood that they will become more independent. By the same token, if we think of career interruptions as a risk to which women are exposed as a result of social norms rather than individual choice, the MPG insures low earners against this risk. Making the MPG proportional to years worked instead of having an on-off switch at one point would make it easier for women (and low-earning men) to escape from this low pension trap—but it would also reduce their insurance against partial careers.

The MPG over time: wage versus price-indexation

So far we have been discussing an MPG that remains constant in real value over time at 1994 levels--\$78 in 2002 US\$'s. This would hold if there were no inflation or if the MPG rose with the price index. In this case the MPG would fall in comparison with wages as the average wage rises for the economy as a whole. It would protect fewer and fewer people in the future. When a young woman who entered the labor force in 1994 retires 40 years later, a price-indexed MPG would be only 17% of the average female wage, and it would be only 12% of the average female wage (8% of the average male wage) by the time she dies 20 years later. This low relative level is the main reason it is received by so few pensioners in our simulations. If we consider future cohorts of women, say those who are age 10 today, a price-indexed MPG would become practically irrelevant by the time they retire.

However, in reality the government has been raising the MPG almost every year on an ad hoc basis, faster than prices and roughly on par with wage growth. By 2005 the MPG already exceeded \$100 (in 2002\$'s). Moreover, the higher MPG applies to cohorts that have already retired, as well as to new retirees. If the MPG were wage-indexed (that is, if it continued to increase at the same rate as wages), it would be \$172 when a young woman who entered the labor force in 1994 retires and average women would collect some subsidy even if they completed secondary school. In fact, the majority of the

women in our sample would then receive some top-up. The female/male pension ratio would rise substantially, to 66-96% (rows 7 and 13).

Currently, increases in the MPG apply to the entire stock of retirees, not simply to new retirees. If this practice (as well as the jump-up at age 70 and 75) continues, the wage-indexed MPG would reach \$291 by the time the woman was 80. Practically all women as well as the bottom two categories of men would then receive a large top-up in very old age. This means that men and women at the bottom end would receive exactly the same pension income—the gender ratio would be 100% in very old age (rows 8 and 14 and Figure 2A). From the viewpoint of reducing the gender gap (as well as the gap between high and low earners), this would obviously be much more effective than a price-indexed MPG.

But it would also cost much more. And it would induce more women to stop contributing to the system once they reached the 20-year eligibility point. Additionally, some men in the lower educational groups might switch to self-employed status and stop contributing after 20 years, since they too would receive the MPG in that case. So the greater equality implied by a wage-indexed MPG is accompanied by higher fiscal cost and moral hazard problems. “Swiss-indexation”—which is 50% price and 50% wage indexation—is one possible compromise. Chilean policy-makers seem ambivalent about these trade-offs between equality, fiscal cost and moral hazard—as evidenced by the fact that they are not required to wage index but have done so through ad hoc political decisions. Protection for future cohorts of very old women and low-income women will be dependent on the choices that they make.

Insurance against slow growth

We also modeled a “slow growth” scenario, in which real wage growth is zero and the real rate of return on pension savings is 3% per year (1.5% during the payout stage) (Appendix Table 1). In this case, lifetime contributions are much lower and so are the annuities that retirees can purchase with their own accumulations. As a result, the MPG floor protects average women through the secondary education level and even protects some full career women and men. This holds true even if it is not formally wage-indexed; in fact, its value is the same whether wage or price indexation is used, when wage growth = 0. In effect, the MPG provides insurance against prolonged low

rates of return. If the low-return scenario materializes, women are the major beneficiaries and gender differentials are narrowed substantially, because the MPG plays a larger role and has a more equalizing impact. Among women, the gap between those with higher and lower education is narrowed. Of course, in a slow growth scenario, the government might have a hard time financing the MPG.

Wage dispersion

Until now we have assumed that each person in a given age-education cell gets the average wage for that cell. We examined whether actual wage dispersion within each educational cell would change these results significantly. We found that only half the women in the bottom education category and one-third of the women in the second category would qualify for some top-up under a price-indexed MPG; the rest would accumulate enough to pay their own way. Practically all of them rise above the MPG level without subsidy if they postpone retirement to age 65. But if growth slows down, some men in the bottom two groups qualify, as well as women up to the university level—even if they postpone retirement. Thus, recipients are a more homogeneous group than would be the case if everyone in the same gender-education cell got the same wage (Appendix Table 2).

Summary of simulated MPG impact

In short, under moderately high growth, the presence of an MPG that is price-indexed raises the female/male ratio of annuities at the bottom end but has practically no impact beyond that. The impact is greater in a prolonged slow-growth scenario. But if the MPG is wage-indexed, it raises the female/male ratio for the majority of women who have not attended university, even under rapid growth. It does so by making many more women, as well as some men, recipients of the MPG subsidy, as the real value of the minimum pension rises over time. The typical woman in every educational category contributes for more than 20 years—enough to meet the eligibility conditions for the state top-up. The rule also encourages these workers to stop contributing to the system as soon as they reach the 20-year point. This negative impact might be avoided if the MPG level were proportional to number of years worked, instead of being a fixed amount with an on-off switch for eligibility.

Comparisons between simulations and actual data on pensions and MPG eligibility

Of our three countries, only Chile has had its new system for long enough to have accumulated a substantial group of retirees, enabling us to test our simulations against actual outcomes thus far. Based on the original plan (retirement at normal ages, price-indexation of MPG, and all workers contribute average amount), we predicted female/male pension ratios of about 30-40%. However, as we have seen, de facto wage-indexation has replaced price-indexation and most men retire earlier than the “normal” age. Our simulations show that both these factors should increase gender equality, bringing female/male pension ratios to 40-90%, depending on educational category. Consistent with these predictions, data show that the actual average pensions of retired women are about 80% that of men. Moreover, consistent with our expectations, the proportion of retired women who are at the pension floor is much higher than that of men—44% versus 31%—and the gender disparity is even greater if widows are included. Most of these pensioners have taken scheduled withdrawals from their own accounts, at the minimum level. Some have already used up their accounts while others are still drawing them down. Once their own accumulations are exhausted, the government will step in and pay the pension—if they meet the eligibility requirement (calculations by authors, based on data on annuities and programmed withdrawals supplied by the AFP and insurance regulators; also see James, Martinez and Iglesias 2006).²⁴

A key question, therefore, is whether they will meet this requirement. We already know that, on average, they will. But the average may hide considerable dispersion. Contribution histories may be normally distributed but with a wide variance, or they may be bimodal, in which case the average is not representative of most workers. To investigate this issue requires access to longitudinal data about individuals, rather than the cross-section that we have used.

However, longitudinal data (or its close cousin, retrospective data) have recently become available (HLSS 2002 and 2004 and SAFP administrative data). They show, as expected, that the average male contributes more often than the average female—mainly because he works more. Moreover, for both genders they show considerable dispersion in contribution histories. This dispersion creates an overlap between outcomes for men and women (see Arenas et al 2004 and 2006; Bernstein et al 2006). Our preliminary analysis of

these data show that many workers contribute quite regularly—45% of post-school-age male affiliates and 35% of female affiliates have contributed 90% of the time since they joined the system, with the others fairly evenly distributed across the spectrum of lower densities. Bimodality, if it exists, is concentrated in women with primary or incomplete secondary education. Thus, we are likely to find many women and some men close to retirement, with low schooling, who have accumulated low pensions yet are ineligible for the state guarantee—they have labor force participation rates below the averages presented in Table 4.3. But these data do not allow us to predict the dispersion of behavior among younger cohorts of women, for whom we do not yet have a full lifetime of potential employment behavior. Their higher and more concentrated years of education may lead them to work more consistently, as they age, than women have in the past.

IV. Replacement Rates

Pensions are often evaluated according to the percentage of the wage that they replace—pension/reference wage. A replacement rate of 40-60% of wage is frequently targeted by policy-makers. But replacement rate calculations can be misleading if not examined carefully. They depend heavily on and vary widely with definition of the reference wage and policies regarding retirement age and indexation.

Sometimes final year salary is used as the reference wage. However, this ignores the fact that earlier wages, which determined the individual's standard of living, may have been much lower. Using longer-term average wage solves this problem but ignores real wage growth in the economy that has occurred in the meantime, raising expected living standards. As our reference wage, we start by using the full time wage earned at ages 51-55, which was close to the peak wage period for men and women. (After their mid-50's many members of our sample had retired and the wages earned by those who still worked may not be representative of wages for the sample as a whole). We focus on female/male comparisons of replacement rates, rather than on their absolute levels. We show the impact on relative replacement rates of the person's own-annuity as well as the minimum pension guarantee.

Using this reference wage, replacement rates for the average male retiring at 65 are projected to range between 54 and 62%, purely on the basis of his own-annuity (Table 4.8, row 1). We would expect the average woman to have a much lower replacement rate, because of her shorter years of contributions and longer period of retirement. However, the replacement rate differential should be less than the annuity differential, because it essentially controls for the wage differences that create part of the annuity gap. Indeed, replacement rates for average women retiring at 60, based on their own-annuities, are 25-30% of reference wage for those without post-secondary education--half as much as men. This rises to 43-55% for those with post-secondary education who work more--and therefore have replacement rates very close to that of men (rows 4 and 10). The minimum pension guarantee raises replacement rates for those in the lowest categories, and this effect is much stronger if the MPG is wage-linked. In fact, a wage-linked MPG cause women in the bottom two categories to have higher replacement rates than men, because the difference in their pensions is much smaller than the difference in their reference wages (rows 7, 8, 13 and 14).

Women who postpone age of pension to 65 raise their replacement rates by 50% and those who work full career have higher replacement rates than men, even though they do not receive any subsidy from the MPG (rows 5, 6, 11 and 12 and Figure 3A). It may at first seem puzzling that full career women get higher replacement rates than men. This stems from the fact that their wages do not grow as steeply as male wages. Male wages at age 51-55 are roughly double what they earned at 21-25, while female wages have grown only about 30% over this aging period. The reference wage for men is a formidable target for them to meet, because their contributions were based on much lower wages when they were young. It is an easier target for women, because their contributions when young were based on wages that were very similar to their peak. Then, if men and women work the same amount and get the same rate of return on their investments, this will produce a higher replacement rate for women. Does the higher female replacement rate mean that women are better off? It will be easier for them to use their pension to replicate the standard of living they previously supported out of their wages; but only because this standard was much lower for women than for men to begin with.

Finally, we examine the implications of a different definition for reference wage--actual earnings, which is the wage rate adjusted for the percentage of time actually worked. That is, we multiply the full time wage by percent of time worked at ages 51-55. The rationale is that pensions are supposed to replace actual wage income, not some theoretical full time wage rate that is not really earned. Since men (and women with higher education) work about 80% of the time, their replacement rate rises by only a modest amount when we take account of actual earnings (row 3). But the reference wage for women in the low educational categories is cut in half, so their replacement rate nearly doubles, bringing it above that of men (rows 9 and 15). These women receive a retirement income that is a lot less than their full time wage rate, but it is a lot more than their actual earnings adjusted for the fact that they only earned wages part of the time (that is, the replacement rate defined in this way exceeds 100% for women with low education). It is a low retirement income, but their working income was also low, because their working time was low. If the purpose of the pension is to replace their wage income, this is the correct definition of reference wage and the pension is fulfilling its purpose very well for these women. But if the purpose is to enable them to be self-supporting, it is more problematic. Clearly, replacement rate comparisons must be used and defined very cautiously.

V. The Impact of Joint Annuities

So far we have worked with joint annuities for men, since married men are required to purchase joint annuities or other joint withdrawals. These annuities reduce the payout to the husband in order to leave a reserve to fund a survivor's pension that is 60% of his pension. Single men, in contrast, have no obligation to provide for a widow's pension so they would receive a higher annuity relative to their married counterparts. How much are married men's benefits decreased and widow's benefits increased by the joint annuity?²⁵ How would the situation change if insurance companies were required to use unisex mortality tables? Unisex tables apply the average mortality of men plus women to both genders, in contrast to gender-specific tables that apply different (higher) life expectancies to women.

Joint annuities

Table 4.9 compares individual and joint annuities for men (retiring at 65) and individual annuities for women (retiring at 60) under the assumptions of gender-specific and unisex mortality tables. The largest monthly payouts are obtained by single men using male mortality tables to purchase an individual annuity (row 1). As a counterpart, single and married women use their own accumulation to obtain an individual annuity at age 60 using female mortality tables (row 5). This dual set of assumptions produces the largest gender difference in annuities.

If the man is married he is required to purchase a joint pension that pays 60% of his benefit to his widow. Under the assumption that she is 3 years younger than he, this reduces male payouts by about 17% (row 1 versus 3). Widows receive the survivor's benefit after their husbands die, and this benefit is much larger than their own pensions, on average. It is also much larger than the MPG, so once a woman gets the widow's benefit she is no longer eligible for the MPG top-up. A joint pension must also be provided if a man is simply co-habiting with a woman who is the mother of his children. Divorce just became legal in Chile. It is not clear whether the joint pension requirement will apply to divorced wives as well and, indeed, whether she will have any claims on her former husband's account before it is annuitized, if he should die.

Unisex versus gender-specific tables

When unisex tables are used, monthly payouts to men from individual annuities decrease by about 8% and to women increase by 6% (compare rows 1 versus 2, 5 versus 6). But for joint annuities, payouts remain very similar whether unisex and gender-specific mortality tables are used (row 3 versus 4 and Figure 4). The basic reason is that both expected lifetimes are taken into account in either case. The fewer years imputed to the widow under unisex roughly offset the extra years imputed to the husband, given these assumptions.²⁶ Although the use of gender-specific versus unisex tables is highly controversial, apparently this choice has little impact on monthly payouts to either spouse under a joint annuity. In fact, joint annuities become relatively less expensive for men to buy if unisex tables are mandated (the reduction from row 1 to 3 is smaller than the reduction from row 2 to 4). However, unisex versus gender-specific tables do make a difference (of 6-8%) for individual annuities, because those purchased by men cross-

subsidize those purchased by women. Thus, the unisex issue becomes salient to single men and women.

Avoiding poverty in very old widows

Most important, the joint annuity is a major source of income for very old women, and it comes exactly at the right time of life, when household income would otherwise decline sharply. It protects very old women who haven't worked in the labor market and have no income of their own. Even for women who have worked, the household income of a very old woman would fall to barely one-quarter of its previous value upon the death of her husband without the joint annuity (or even less, if she has used up all the money in her account). With the joint annuity, household income (from widow's pension plus her own pension) remains at about 70% of its previous value. As we saw in Chapter 1, according to OECD scales it will cost the widow in a single person household 67% as much to live as it cost the couple. Thus, the joint pension, together with her own pension, enables her to maintain her previous standard of living after her husband dies, without imposing a cost on the public treasury. (The old systems, which required her to choose between her own pension and the widow's benefit, automatically reduced household income to 30-40% of its previous value and required the standard of living of widows to fall dramatically).

VI. Lifetime Benefits and Imputed Taxes

Comparisons of monthly annuities are of interest but ignore the fact that women are allowed to receive their pensions 5 years younger and typically live longer than men. In addition, the survivor's benefit begins much later in life than own benefit or MPG. To compare how much men and women get over the course of their lifetimes, it is necessary to add up their full lifetime benefits, in expected present value (EPV) terms. This also enables us to compare how these lifetime benefits compare with lifetime costs. If benefits exceed lifetime costs, this means the worker has received a positive redistribution, a higher rate of return on contributions over-all, and vice versa. The difference between lifetime costs and benefits comes from two sources: the tax cost of financing the MPG

and the joint annuity requirement, which imposes an opportunity cost to married men and a gain to their wives.

Gross benefits

Table 4.10 presents the expected present value of the lifetime benefits from annuities and transfers, as evaluated at age 65 (with the 3.5% annuitization rate also serving as the discount rate). The expected lifetime benefit from the individual annuity for single men equals the fund accumulations given for men in Table 4.5 (row 1). The expected present value of the MPG is 0 for the average man. The reduction in lifetime benefits for married men owing to the joint annuity mandate increase in absolute value with schooling but in each case it is 17% of the single man's lifetime benefits (row 2). These amounts become transfers to these individuals' spouses; the cost to the husband becomes a benefit to the wife. If the husband would have provided equivalent insurance for his wife voluntarily, this is not really an extra cost—the mandatory insurance simply replaces the voluntary. But if the husband would have preferred to consume some of this amount during his lifetime, the joint annuity requirement becomes a real cost to him. (For empirical evidence on this point see Bernheim et al 2003).

Turning to the case of women, we start with the average woman's individual annuity (row 4). These values are larger than her fund accumulation at retirement age 60 in Table 4.5 because we are reporting the present value of benefits as viewed at age 65. The additional amount derived from a price-indexed MPG is positive only for the group with least schooling (rows 5 and 9 and Figure 5). The positive EPV of a wage-indexed MPG is much larger and more widespread if it is wage-indexed--rows 6 and 10). For the average married woman, the joint annuity increases her expected lifetime benefits by 40-45%, even though she likely doesn't start receiving it until she is in her mid-seventies (rows 7 and 11 and Figure 6).

Full career women get monthly annuities that are double those of average women but, because their pension begins at age 65, the lifetime benefits of these two groups differ by only 25-70% (compare rows 12 and 4). Not surprisingly, the widow's pension has a much smaller effect relative to own annuity for full career women than for average women; it increases lifetime retirement income by 25-30% (compare rows 13 and 11).

But it has a much larger effect for ten-year women, roughly doubling their income (row 17).

En toto, on a lifetime basis average married women get 73-94% as much as average married men, most ten-year women get less than 50%, but full career married women actually get more than comparable married men—due to the combination of the own and the joint annuity (rows 18, 19 and 20 and Figure 7A). Single women, obviously, get much less than married women with the same work behavior—but they are also likely to work more, having fewer family responsibilities keeping her at home. A single woman who works full career gets approximately the same lifetime retirement income as an average married woman.

Note that lifetime gender ratios are much higher than monthly gender ratios, owing to the earlier retirement age and greater longevity of women, the MPG and the joint annuity. Which matters the most? If we care about standard of living, monthly benefits are the key, but if we are measuring redistributions, lifetime benefits from all sources matter.

Net benefits

We proceed, then, to assess redistributions. We don't know the full cost of the MPG, especially since it depends partly on strategic behavior by low earners and ad hoc decisions about MPG indexation that will be made in the future. Since the MPG is financed out of the government's general revenues, inter-generational cost-shifting is involved and taxes on both capital and labor are applied. However, to get an idea of the direction of redistribution, we make the simplified assumptions that each cohort pays its own bill and within each cohort taxes are distributed among educational-gender groups proportional to their lifetime earnings. Then, it is easy to see that the net MPG, which equals the gross MPG minus the imputed tax cost of financing it, is negative for men and for all except the bottom group of women (if it is price-indexed). This constitutes a small redistribution away from men and high-income women, toward low earning women who have worked about 20 years in the formal labor market. Since we assume a price-indexed MPG, it will be small, its tax cost is also small, and so is the work disincentive effect, except in a prolonged slow growth environment. But these become larger if the MPG is wage-indexed.

The major points from this analysis of gross and net lifetime benefits: low earning women with twenty years of contributions are the main recipients of the MPG and most other groups are payers. The total transfer is modest if the MPG remains constant in real value because it is price-indexed or if some potential recipients do not meet the 20-year eligibility requirement. In contrast, all married women gain substantially from the joint annuity, which provides a far greater lifetime transfer, from their husbands. It is a major means of support for very old women who have spent much of their lives working in the home. When we add all these sources of income, the expected lifetime retirement income for average married women is 80-90% and for full career women more than 100%, that of married men (Tables 4.10 and 4.12).

VII. Who Gained or Lost Most from the Reform?

Comparison of the new and old social security systems in Chile is difficult because the old system was non-sustainable and unable to provide the promised benefits. Since we don't know what adjustments would have been made to make the old system solvent (higher taxes? lower benefit? whose taxes or benefits?), it is impossible to determine absolute gains or losses from the change. To avoid this problem we focus on relative changes in the position of men and women in different educational-marital groups. In effect, we assume that the adjustment to achieve fiscal balance would have involved equi-proportional tax hikes or benefit cuts for all groups under the old structure, leaving relative positions intact, and we compare these with relative positions under the new system. We ask: (1) Which educational-marital-gender groups gained or lost the most from the reform, in a relative sense? (2) Did the gender ratio get larger or smaller in the process of the reform? We carry out this analysis taking into account the full expected present value of lifetime benefits. We already have this for the new system, and we apply the old defined benefit formula to obtain the promised benefits for the old system. But bear in mind we don't assume that these promises would have been kept in an absolute sense, only that relative positions will be maintained.²⁷

A priori, we can identify many reasons why the reform might have helped or hurt women. Women with less than 10 years of contributions got no benefit at all under the

old rules, but receive an annuity in proportion to their contributions under the new rules, so their position should be improved. In contrast, women with just 10 years of contributions got a favored accrual rate and replacement rate under the old system, while their pension in the new system depends on the normal market rate of return so their position may have deteriorated. Marginal benefits after 10 years diminished sharply under the old system, so full career women would be expected to gain from the reform. High final year earnings were rewarded under the old system, while earlier earnings are rewarded (by compound interest) under the new system; this change benefits women who work while young. But many men bumped up against the ceiling on benefits previously, while now there is no ceiling; this change benefits men. Most important, women had to choose between their own benefit and the widow's benefit in the old system but they can keep both in the new system (see Table 4.1 for more details). Finally, readers should recall that our estimates for the old system assume zero inflation or full price indexation, neither of which were the case. Annuities in the new system, in contrast, are fully indexed to prices and therefore insured against inflation. This provision helps men, but women even more because they live longer.

Both systems have a minimum pension, but in the old system it was set on an ad hoc basis while in the new system it is formally price-indexed and, based on political decisions, has been rising even faster, with wage growth. This should benefit all pensioners, but women in particular, because they live longer and have lower own-pensions. Since we do not know what the minimum pension would have been in the old system, we assume that it would have been set at the same level as the MPG in the new system. This introduces a bias in favor of the old system, because it ignores the fact that the old system did not provide inflation insurance.²⁸ This bias is particularly great for ten-year women, who were eligible for the minimum pension in the old system but not the new system.

How gender ratios changed due to the reform

We proceed to compare the female/male ratio of lifetime benefits in the new and old systems. Ratios equal to 100% indicate that the expected present value of lifetime benefits for women equals the expected present value of benefits for men from the same schooling level. The top panel pertains to gender ratios in the old system, the bottom

panel in the new system. Based on the previous section, we would expect gender ratios to change in divergent directions for different sub-groups, with the biggest gains going to working married women, and that is exactly what we find.

As expected, gender ratios for the average woman are higher in the old system when we look at own-pensions alone (compare rows 1 versus 6 in Table 4.11). Adding the MPG raises the relative standing of women in the lowest education group, but all female/male ratios post-reform remain below the ratios pre-reform if the MPG is price-indexed (row 1 versus 7). If it is wage-indexed, the positive effect becomes much larger for the bottom two schooling groups, but the other groups continue to remain below the pre-reform situation (row 8). This deterioration occurs mainly because women did not get an actuarial benefit reduction for retiring at age 60 in the old system, as they do in the new system. This is the situation for single women with average work experience. When the widow's benefit is added to the new and old systems, this raises new female/male ratios dramatically, so they exceed pre-reform levels for average married women in almost schooling categories (row 2 versus 9). This effect becomes even more pronounced for married full career women, where almost all gender ratios exceed 100% in the new system (row 4 versus 11). This is the group that gains the most, because they work the most, don't retire until age 65, therefore don't take an actuarial reduction in pension amount, and they no longer have to give up their own annuity to get the widow's annuity, as they did previously. If women respond to incentives, this should induce more women to work "full career." In contrast, ten-year women lose the generous pension and minimum pension guarantee they got for only ten years of work in the old system, so their relative position deteriorates (row 5 versus 12).

Ratios of post-reform to pre-reform lifetime benefits

Finally, to calculate more precisely who gained most in relative position, we calculate in Table 4.12 the ratios of post-reform to pre-reform expected lifetime benefits for each gender-educational sub-group. We normalize according to the ratio for the married man in the top educational group. That is, we measure the new/old lifetime benefits for each sub-group, and we then divide by the new/old ratio for the highest income married man.²⁹

We follow this complex procedure because we want to be able to compare relative gains or losses among all gender, educational and labor force attachment sub-groups, without assuming that the absolute value of promised benefits would have been paid under the old system. For example, suppose that expected lifetime benefits had doubled for the top-educated man and trebled for the low-educated man. Then, their separate new/old ratios would be 2/1 and 3/1, respectively, and the normalized ratio for the latter would be $3/2=1.5$, informing us that the man with low education improved his initial position 50% more than the man with high education. This relationship would hold even if the old system had to change to keep it solvent, so long as these changes maintained the same relative positions that existed initially. Suppose, for instance, that the old system had cut everyone's benefit in half. Then, the new/old ratios for the high and low education groups would become 4/1 and 6/1, respectively, but the normalized ratio would remain $6/4=1.5$. In the following discussion, when we use the term "gain" we mean gain in relative position: the group gained more or lost less from the reform than the top educated married man.

The key observation is that differences among sub-groups within each gender are greater than differences between the genders, with educational level and marital status mattering the most.

1. Most consistently, men and women in lower schooling groups gain more than others from the reform (compare col. 1-2 versus col. 3-5). This is primarily because they have a flatter age-earnings profile, hence make more of their contributions early on and accumulate interest that produces high annuities in the new system. In contrast, the more educated groups have steeper age-earnings profiles with high wages at the end that produced high benefits under the old system formula.

2. Single men improve their position compared to married men (compare rows 1 and 2). This is because married men must finance a joint annuity in the new system, while single men use their entire fund to finance their own pension. This differs from the old system, where the widow's benefit was financed by the common pool.

3. In contrast, married women gain more than otherwise identical single women, because they get to keep their own annuity plus the joint annuity, while under the old system they had to choose between the two (compare rows 3 versus 4, 5 versus 6).

However, single women tend not to be identical to married women. As we showed in Chapter 3, they work more. If in fact they work like full career women, they gain approximately as much as average married women (compare rows 4 and 5).

4. Married men gain less than married women with the same work histories, because the former pay for the joint pension while the latter receive it (compare rows 1 and 6). (This effect would be wiped out if we used the household as the unit of comparison, since it involves transfers from husband to wife).

5. Finally, relative gains increase with women's attachment to the labor force, because the new system rewards continued work, while marginal benefits to years of contributions diminished in the old system. In particular, in the old system most women got very little benefit from their own contributions since the widow's benefit was greater and crowded it out, while full career women kept their own benefit but lost the widow's benefit. In contrast, all married women get both benefits under the new system. Full career married women are the biggest gainers while ten-year women lose relative to other groups and also lose their access to the minimum pension (Figure 8A).

The main message from Chile:

Women's lower wage rates while working continue to produce a lower pension accumulation and own-annuity after retirement. This is exacerbated by the lower normal retirement age legislated for women's retirement. Public transfers from the MPG mitigate this effect for the lowest earners and prevent poverty at a low tax cost but these transfers do nothing for the gender gap above the bottom categories. Moreover, this equalizing impact will become negligible in the future if the MPG is not at least partially wage-indexed. If it is wage-indexed, its effect is larger, broader and long-term, but it will cost the government considerably more money and it may discourage marginal work by low earners.

More important, mandatory intra-household transfers from men to married women through the joint annuity redistribute toward women. This redistribution is accomplished without placing a large burden on the public treasury and without discouraging women's work. For this reason, married working women, especially full career women, improve their relative position most consistently after the reform. As the female labor force participation rises through time for exogenous reasons or as an

endogenous response to incentives, the new system will become increasingly favorable toward women.

The key remaining questions with gender implications that policy-makers face: How much are they willing to pay to protect future cohorts of women? (This requires partial or full wage linkage of the MPG or other safety net). What can they do to protect low earning women with fewer than 20 years of contributions, while at the same time avoiding the marginal work disincentives faced by those with more than 20 years of contributions? (Having the MPG proportional to years worked would help solve both problems). How can they close the gender gap for middle-earning women? (Equalizing normal retirement ages would help). What are the special problems faced by divorced women? (This requires rethinking of the MPG, survivors/benefits and the joint pension requirements). What about women who are not covered by the system or have very low density of contributions? (Possible non-contributory benefits are discussed in Chapter 8).

Chapter 4: Argentina

The old Argentinean social security system was in serious trouble before its reform in 1993. Besides the long run problem of rising costs due to population aging, a deficit existed even in the short run owing to evasion, early retirement and haphazard records. The system was in default. The new system was adopted in 1993 and implemented in 1994, with some important modifications since that time.³⁰ Unlike Chile's new system, which was established during a dictatorial regime, the new Argentine system was developed by a democracy, which required many political compromises in order to gain the support of diverse constituencies. We analyze how women fared in this process. The methodology is the same as that used for Chile, so we suggest that the reader refer back to chapters 3 and 4 for a fuller description.

However, an additional caveat is needed because it is much more difficult to define the new or the old system in Argentina. In the years leading up to the reform, the system changed frequently, due to fiscal pressures to cut costs on the one hand and political pressure to maintain benefits on the other hand. Enforcement of the rules was uneven and records sparse. Ambiguities sometimes led to litigation, with the net result undetermined before yet another change took place.

These ambiguities persist in the new system. The government has been continuously modifying the system, particularly the financing source, size and eligibility requirements for the public benefit—especially after the financial crisis of 2002 and resulting economic turmoil. Thus, it is difficult to ascertain whether women gained or lost due to the reform, because it is difficult to define either the reform or the counterfactual; we are chasing a moving target. We start by describing the stylized version of the old and new system that we analyze in this chapter, while warning the reader that it probably will have changed again before this manuscript is published. Most important, we focus on the issue of which design features matter the most in determining the gender outcome.

I. The Old and New Systems and Our Data for Comparing Them

The old system

The old system was a traditional pay-as-you-go defined benefit system. It was highly fragmented, with different schemes for public and private sector employees and for particular occupations within each sector. Moreover, it was frequently modified, in efforts to make it more generous, on the one hand, and more fiscally affordable, on the other. We describe the largest plan for private sector workers, shortly before the reform. It is not very different from (albeit a bit more generous than) the old Chilean system.

Workers with at least 20 years of contributions received 70% of base salary plus an additional 1% for every year over 30, with base salary defined as the best three out of the last ten years. Men could retire at age 60, women at 55. Workers with 10 years of work received 50% of base salary plus an additional 1% for every year over 10 and could retire at age 65. Women were more likely to take the ten-year option. Past salaries were not indexed up for inflation to determine the reference wage, nor was the pension price-indexed automatically after retirement. In the inflationary Argentinean context, this made the real benefit much less generous than appeared at first. But a minimum pension that was raised on an ad hoc basis with inflation meant that low earners with ten years of service received a generous (albeit uncertain) pension relative to their contributions.³¹

The new system

The new multi-pillar system took Chile's scheme as its model, but made important modifications. Like Chile, Argentina included a public benefit that provides a safety net and a privately managed retirement saving account. However, the safety net is larger and much less narrowly targeted than that in Chile, the private account is smaller, and workers are offered a public defined benefit alternative to the private scheme.³² As of 2001, over 80% of all contributors, including most women, were in the private account rather than the public defined benefit, so in this study we focus on the former, as well as the safety net that covers all eligible workers.

Initially workers were required to contribute 11% of payroll into their retirement saving accounts, and choose among numerous managers (Administradoras de Fondos de Jubilacion y Pension or AFJPs) to invest these funds. This contribution rate was reduced after Argentina's fiscal crisis. Pensions depend on amounts accumulated, as in Chile. Unlike Chile, where a separate payment is made to cover administrative fees plus

survivors and disability insurance, in Argentina these fees are taken out of the mandatory contribution. These fees fluctuate from year to year in response to changing administrative and insurance costs. Initially they totaled about 3.25% of wages, leaving a net of 7.75% for investment, and we used this number in our simulations. By 2005 they were only 2.5% of payroll (James et al 2000 and 2001; AIOS 2005). The reduction in fees will leave a larger amount to be invested, hence will increase annuities by about 10%. On the other hand, the reduction in contribution rate will decrease accumulations and annuities by a larger amount. Neither effect will alter the gender ratios on which we focus.

Upon retirement (age 65 for men, 60 for women), the accumulated assets are taken out in the form of gradual withdrawals or annuities, with lump sums allowed for amounts in excess of a specified floor. For married men as well as women, the annuity must be joint with 70% to survivor; however this implies a cost mainly for men, since women are expected to outlive their husbands.

For the safety net, Argentina provides a basic “flat” benefit, starting at age 65 for men, 60 for women. Unlike Chile’s MPG, this is not a top-up--all eligible workers receive it. But eligibility in Argentina was initially restricted to workers with at least 30 years of contributions—a provision that excludes most women. As an alternative that applied mainly to women, workers who reached age 70 with 10 years of contributions were granted a reduced flat pension that is 70% of the full amount. Initially the flat benefit, plus transition costs (in the form of compensatory payments to workers for credits earned under the old system) were financed by a 16% payroll tax paid by employers. More recently, the payroll portion has been reduced to less than half of this amount, and the rest is financed out of general revenues and debt.³³

Argentina’s public benefit has been under constant revision. For example, a minimum pension has long existed, but it is strictly ad hoc, therefore impossible to model for the long run. Recently the minimum pension was raised to a level that is more than double that of the flat benefit, so in about half the cases it supplants the flat, both for men and women. (Workers with less than 30 years of contributions get a partial minimum). Also, a recent law allows retiring workers to report any number of years of self-employment prior to 1993, in order to enable them to qualify for the flat or minimum

benefit. Since these revisions are still in flux and it is not clear how long they will continue, our analysis focuses on the benefit structure that was set up in 1994, but we discuss the impact of these changes on women's relative position.

Participation in both parts of Argentina's system is mandatory for the self-employed as well as employees—much more ambitious than Chile. But data on actual contributions suggest that this ambitious mandate is being enforced much less effectively than that in Chile, with a resulting low density of contributions that has a large impact on the final pension (See Table 5.1 for a comparison of the old and new systems and basic economic and demographic data about Argentina).

Data

The ideal data set to calculate future benefits for men and women would be longitudinal—examining the contributory behavior of a representative sample of individuals through time. Unfortunately, such data are not available in Argentina. Thus, as in Chile, we construct synthetic representative individuals based on cross-sectional data. Our primary data source is the *Encuesta Nacional de Gastos de los Hogares* (ENGH), a nationally representative household survey carried by the Instituto Nacional de Estadística y Censos de la República Argentina (INDEC) in 1996-97. This survey used a sample that represents 96% of the country's population. The sample includes 27,260 households that contain 103,858 individuals, of whom 69,895 are 16 years or older. All the regions covered by the survey are considered urban. Close to 42% of the working age population resides in Metropolitan Buenos Aires. The survey collects detailed information on household expenditures, demographics, educational attainment, occupation, employment, income and whether or not the individual is contributing to a social security system.

We use these data to observe the work and earnings history of men and women at different stages of their life cycle, and construct our synthetic individuals under the assumption that today's young workers will follow the path indicated by this cross-section. Shortcomings of this approach were discussed in chapters 3 and 4. To handle these shortcomings, and to indicate the heterogeneity among women, we construct different employment histories for five educational categories and three different degrees of labor force attachment: average women, full career women (whose labor force

participation is the same as that of men) and ten-year women (who work continuously for ten years prior to having children). Most women in the past may have behaved like ten-year women while the future may have many full career women, due to changing educational composition and social norms. Single women today work almost as much as full career women. The typical woman is assumed to be single initially, and to marry at the median marriage age for women in her schooling category.

Years of work and contributions

Table 5.3 shows that men work 39-41 years (about 80% of the time between age 16 and their normal retirement age of 65), while women work 18-34 years (40-75% of the time between age 16 and their normal retirement age of 60). For women, participation is strongly correlated with education. Thus, the higher modal education for younger female cohorts is likely to increase their aggregate participation rates. For both genders, but especially for women, participation drops off dramatically after age 60. Men seem to work slightly more and women slightly less than in Chile, but we cannot tell whether this effect is real or an artifact of our data.

We wish to establish how men and women who are in the system fared as a result of the reform but we do not know whether or not an individual is affiliated, as we did in Chile. The ENGH tells us whether a person is currently contributing, but it does not tell us whether non-contributors ever contributed in the past, which would allow us to distinguish between affiliates and non-affiliates. Affiliates may have higher work propensities than non-affiliates, especially among women, but we only observe the weighted average of their behavior; we are unable to separate out these two groups. This may lead to an underestimate of work experience among women who participate in the social security system.

As a corollary, we don't know the density of contributions among affiliates, as we did in Chile. We know that only 39% of male workers and 33% of female workers contributed in 1997, but, by definition, affiliates will have a higher contribution density than workers as a whole. At the same time, we also know that the compliance rate in Argentina is much lower than that in Chile, so contributing years are likely to be far less than working years among affiliates. The regulator of the system recently examined a sample of affiliates during a 36-month window and another study used administrative

records to examine affiliates during a 90-month period. They found that the average affiliate contributed 50-60% of the time (SAFJP and Instituto Torcuatto di Tella 1999; Bertranou and Sanchez 2003). The distribution appears to be bimodal. At one extreme are a large group of working affiliates who contribute more than 80% of the time, at the other end are a large group who contribute less than 20% of the time, and in-between are about a third of all affiliates who contribute varying amounts from 20% to 80% of the time (Table 5.2). To capture this heterogeneity in our analysis, we depict two types of affiliates--those who contribute regularly when they work (which implies a contribution density of about 80% for men, 40-75% for women) and those who contribute only 60% of their working time (which implies a density of 48% for men, 24-45% for women). Importantly, this variation does not affect our estimates of the gender ratio of private pension but, as we shall see, it may differentially affect the eligibility of men versus women for the flat benefit.

Earnings

As for Chile, we estimate an average wage for each sex-age-schooling cell (Table 5.4), using 5-year age groupings. For men, monthly wage rates rise until age 50, then level off and decline. For women, wage rates rise less steeply. (The sharp rise at age 60-65 for those with secondary or higher education is probably a result of selection bias among those who stay in the labor market at that point). The female/male ratio of monthly wages varies between 50% and 80%. It is generally somewhat lower than in Chile, perhaps because the Argentinean sample includes part time as well as full time workers, affiliates as well as non-affiliated, possibly irregular, workers.

II. How Women Fare--accumulations and pensions from their own accounts

How much do men and women accumulate?

We show the accumulation of funds in the retirements savings accounts of our representative men and women: 5 educational groups, 3 different degrees of labor force attachment among women (average, full career women (who adopt male work propensities) and ten-year women (who work only ten years prior to child-bearing). In addition to the results for affiliates who contribute regularly when they work, we also

show the results for (low density) affiliates who contribute only 60% of their working time.

We base our simulations on a net contribution rate of 7.75%--11%-3.25% for administrative fees and survivors and disability insurance fees (this initial fee has since declined; see James et al 2000 and 2001; AIOS 2005). Applying this net contribution rate to the average wage and work patterns developed above for each gender-age-schooling cell, we obtain the expected retirement accumulation for each type of worker. In our baseline scenario, we add a secular growth rate of 2% per year to real wages and the rate of return is 5% during the accumulation stage, 3.5% during the payout stage. We also simulate a slow growth scenario in which real wage growth is 0 and the interest rates during accumulation and payouts are 3% and 1.5%, respectively; in recent years Argentina has been going through a spell of slow growth. We assume that men retire at the legally allowable age of 65, women at 60, although we also show the consequences when women postpone the age of pensioning to 65.

We would expect women to have lower accumulations and benefits relative to men in Argentina than in Chile, because of their relatively lower wages and contribution propensities (This is attributable, in large part, to the fact that our data on Argentina reflect all workers while in Chile they are based on system affiliates, whose work patterns are more homogeneous). Indeed this expectation turns out to be the case (Table 5.5). The average woman accumulates only 24-40% as much as the average man--considerably less than that in Chile. This gender ratio is unchanged whether the contribution density is 100% or 60% (compare rows 9 and 14). As in Chile, the accumulation increases by almost 30% if women postpone their age of pensioning to 65 (rows 3 and 10) And the gender ratio is hiked to 65% if women adopt the work patterns of men (rows 4 and 11 and Figure 1B). But a large gap remains, even larger than in Chile, due to the larger wage differential in Argentina (compare rows 11 versus 12).

Expected Pension Benefits

Upon retirement, workers in Argentina, like Chile, have a choice between gradual withdrawals and annuities, but our simulations assume the latter. Annuities and programmed withdrawals must be joint for both spouses, with the widow getting 70% of the husband's full benefit when he dies. Gender-specific tables are used, although unisex

tables are under discussion. Later, we compare their effects. On average, wives are 3 years younger than husbands and have a life expectancy that is 3-4 years greater than men. Men retiring at age 65 survive 14.5 years while women retiring at 60 are expected to live 22.5 years. Their earlier retirement age and greater life expectancy will obviously reduce the monthly annuity they get from their accumulation (but, as discussed below, it increases the lifetime present value of the flat benefit).

The resulting annuities for married men retiring at age 65 range between US\$153 and \$701 (in 2002 US\$'s) depending on schooling (Table 5.6, row 1). Annuities for the average woman retiring at age 60 are 20-35% of the corresponding male annuity (rows 3 and 8). For those with 60% density the annuity value falls proportionately but the gender ratio is unchanged (rows 2, 7 and 12). Women get lower annuities relative to men than in Chile, because of their relatively lower years of work and wages. Postponing pensions to age 65 will raise the typical woman's annuity by 50% (rows 4 and 9). The gender gap falls substantially with more schooling, but this is entirely due to the greater labor force participation of educated women. When we hold participation constant by assuming that women work the same as men (full career women), we eliminate and even reverse the equalizing impact of education on the gender gap (rows 5 and 10). The female/male ratio of pensions is then about 65%, except for the highest university group where it is 59%. (Apparently in Argentina, as in Chile, higher education brings much greater rewards to men than to women).

Finally, worth noting is the very low ratio between the annuities of women with top and bottom education—only 13%—compared with 22% for men. The gap is much larger for women because the labor force participation of women is positively correlated with education. We return to this gap when we discuss the role of the public benefit.

III. The Flat Benefit

Until now the story has been very similar, in general outline, to that in Chile. However, the flat benefit is completely different in cost and targeting from Chile's MPG.

The full flat benefit—mainly for men

Every eligible retiree gets a monthly benefit of 200 Argentinian pesos from the public treasury. In 1994, when the Argentine was pegged to the dollar, this was equal to US\$200. It was 30% of the average male wage, 45% of the average female wage and 130% of the poverty line. It remains at Argentine \$200, but with dollarization gone, at 2002 exchange rates the US\$ value has fallen to \$77. In absolute size and as a percentage of average wage it is very similar to the MPG in Chile. However, the full \$77 goes to all eligible workers in Argentina and they get it in addition to their own annuity, rather than as a partial top-up for a small group, as in Chile. This provides a more diversified pension source in Argentina. Needless to say, Argentina's flat benefit is much more costly than Chile's MPG.

To contain costs, Argentina has set quite different eligibility conditions from those in Chile. For the full flat benefit, 30 years of contributions are required. This high number of contributory years means that men will be the primary recipients. The typical man in all educational groups will meet the 30-year requirement and gets the full \$77 starting at age 65—providing he contributes most of the time that he works (in reality this turns out to be a big proviso because many men evade contributing). This adds another 10-50% to the own-annuities of male recipients (Table 5.7, rows 2 and 3). Because it adds a constant absolute amount, therefore a proportionately larger amount to the retirement income of workers with small annuities, it is quite effective at equalizing pensions between high and low earning men. The pension ratio between men with top and bottom education falls from 4.6/1 to 3.4/1 when the flat benefit is added.

In contrast, only full career women and average women in the top educational category meet the 30-year eligibility requirement. As a result, at age 60 pension differentials are increased further between women with high and low education (row 6). And at 65, when men get the full flat benefit but most women don't, the differential is increased between men and women (row 15). This is the exact opposite of the targeting of the MPG in Chile, where most men don't get a top-up and women in the bottom schooling group constitute the main recipient group.

The reduced flat benefit for women

However, the story does not end here--the politics of benefit entitlement in Argentina are never so simple. Most women workers with primary and secondary

education are eligible for the reduced flat benefit—US\$54—starting at age 70, which only requires ten years of contributions. Even though this benefit is smaller in absolute value than the full flat that more educated women get, it represents a much larger proportionate addition to the retirement income of these women. It also constitutes a much larger proportionate increment for women than for men. It doubles the monthly pension of low earning woman and trebles the monthly pension of ten-year women (Table 5.7, rows 8 and 12 and Figure 2B). Thus, at age 65 women at the lower end of the educational spectrum have a retirement income that is only 15-20% as much as their male counterparts, but at 70 they get 35% as much (row 15 versus 16). Moreover, if we compare Chile's MPG with Argentina's flat benefit, we find that the flat narrows the gender ratio at age 70 across all educational groups, not simply the lowest group. It also narrows the pension ratio between workers with top and bottom education. Moreover, the reduced flat benefit provides protection to women with limited labor force attachment, such as ten-year women. Of course, it costs much more than Chile's MPG.

Insurance against slow growth

In a slow-growth environment the flat benefit plays a relatively more important role and all these disparities in gender ratios are narrowed further since the accumulations and annuities are smaller but the flat benefit retains its constant value. The flat benefit is now greater than the own-annuity for most women and also for many men (See Appendix Table 3). It is a major source of insurance against an economic downturn—pensioners are protected much more than workers. Argentina's flat benefit is much more all-encompassing and equalizing than Chile's MPG. But it also costs much more.

Work (dis)incentives

Argentina's attempt to extend this flat benefit to most old people, while also rewarding work, leads to a puzzling pattern of work (dis)incentives. Women face a large reward for working ten years in the formal labor market, but no marginal benefit from the public pillar over years 10-29; then in year 30 the public benefit jumps discontinuously to a full flat that starts at a much earlier age. This arrangement is costly for the public treasury, its equity is questionable, and it does not seem consistent with positive work incentives over the range of years where most women now work (18-25 years). Argentinean policy-makers have also reached this conclusion and are considering several

alternatives, including linking the flat benefit more continuously to years of work. This discussion underscores the extreme sensitivity of gender outcomes to detailed eligibility rules.

The widow's flat benefit

Besides the flat benefit that is paid to workers, the public system pays all widows a flat benefit that is 70% of the husband's flat when the husband dies. In effect, this doubles their own flat benefit, for very old women—providing they have been married. Unlike Chile and Mexico, Argentina continues to subsidize married over single women.

Low density of contributions

So far we have assumed that workers contribute, as required. But in countries with a large informal sector and substantial self-employment, it is very difficult for governments to enforce this mandate. As a result, a high proportion of workers contribute for only part of their working lives. Although until now our discussion has focused on affiliates who contribute regularly when they work, we also measure outcomes for “low density” affiliates who contribute only 60% of the time when they work.

This low density of contributions when working means that the retirement funds accumulated and the annuities they can purchase will be only 60% as great as we have estimated, on average. Low-density women look a lot like the ten-year women we have already discussed. Perhaps more important is the change for the low density male—he will only be eligible for the reduced flat benefit rather than the full flat. This eliminates one of the sources of disparity between the retirement incomes of men and women, so the gender differential narrows, albeit at low absolute pension levels

However, a substantial proportion of workers will be very low density, not even eligible for the reduced flat benefit because they contribute for less than ten years. This group is likely to be predominantly women with low levels of education. Their very low number of contributory years means they have a small annuity and no flat benefit, leaving them in a precarious financial position as they age unless they have other sources of income. As a response, the government has recently made it easier for workers to acquire eligibility *ex post*. Specifically, retirees are now allowed to claim any number of additional years of self-employment prior to 1993 upon retirement, to become eligible for the flat benefit. Their belated “contributions” are financed by taking a 20% reduction in

the public benefit. We don't know whether this provision will be extended into the future nor do we know how many people are aware of and exploit it today. This ex post claiming process avoids the problem that very low-density workers will fail to attain eligibility. It particularly helps women, who are most likely to find themselves in this situation. But it also completely undercuts the concept of a linkage between benefits and contributions, encourages further evasion and raises the fiscal cost to the government.

(Lack of) indexation, insurance against slow growth and the minimum pension

The flat benefit is neither price nor wage indexed. Inflation was very low during the period when the peso was pegged to the dollar so at that time the absence of price indexation was not a big problem, but is likely to become a bigger problem in the future. Additionally, without price indexation the benefit may fall in real terms during periods of slow growth. That is when it is most needed but it is also the time when the government's fiscal capacity is lowest. While ad hoc adjustments are inevitable, the outcome is uncertain.

What has actually happened? When Argentina devalued relative to the dollar, the flat benefit remained fixed in nominal pesos, which of course meant that it fell dramatically in dollar terms and probably in real terms as well. Recently, a minimum pension has been added and increased. Workers with thirty years of contributions get the full minimum, those with ten years get a reduced minimum and, as discussed above, eligibility can be attained ex post by self-declaration upon retirement to "solve" the low density problem. The minimum, which is now \$167 in 2002 US\$'s or 40% of the average taxable wage, applies against the combined total of the own-annuity plus the flat benefit. Table 5.7 demonstrates that, if this situation continues, average women in the bottom three educational categories, most ten-year women and some low-density men will get the minimum. In effect, both the flat benefit and their own-annuity will become irrelevant to them.³⁴ This will add another disincentive to formal sector work and contributions—it will perpetuate the low-density problem that it is supposed to address. It also equalizes pensions of men and women, high and low earners.

IV. Replacement Rates

Since pensions are designed to replace wages at a point when the individual is too old to work, they are often compared with the wage rate that the individual earned, as an indicator of adequacy. It is commonly believed that women must have lower replacement rates than men, because of their shorter work periods during which contributions are accumulated. Actually, the situation is much more complicated, with alternative definitions of replacement rates yielding very different results, and under reasonable scenarios women have higher rates than men.

A key factor in the definition is the choice of reference wage with which the pension is compared. We start by using wage rates and earnings for workers at ages 51-55, which was close to the peak period for men and women. (We do not use final year's wage because our data for later ages are biased by the non-random selection of workers into early retirement, hence their disappearance from our wage set). Since the replacement rate implicitly normalizes the benefit by the reference wage, we expect it to be more similar for men and women than absolute benefits are, and indeed this is the case (compare the gender ratios in Tables 5.8 and 5.7). Still, women's own-annuities replace only a small percentage of their wage—146-24%, much lower than men (Table 5.8, rows 5 and 10). When the flat benefit is added, replacement rates jump ahead for both genders, especially for low earners. Women now replace more than a third of their wages and the gender ratios narrows (rows 6 and 11). And for full career women, who work as much as men, replacement rates reach 50-80%. They are much higher for women than for men so gender ratios exceed 100% (rows 7 and 12 and figure 3B). While this may seem surprising at first, it is a consequence of the greater importance of the flat benefit for women at the low end, and the flatter age-earnings profiles of women at the high end.

But actually, very few women earn the wage rate that we are using as the reference wage. In any given period the average woman works less than half the time and therefore her annual earnings are only a fraction of the full time wage rate. When thinking of pensions as a replacement of wage income, it would seem that the reasonable wage income to use is one that women actually earn, rather than a theoretical full time rate. We therefore change our reference wage to reflect actual earnings, by adjusting for proportion of time worked between ages 51-55. We then find that the average woman

with primary or secondary education replaces 72-97% of her earnings, much more than her counterpart male colleagues (rows 8 and 13). The gender ratio exceeds 100%.

In sum: women get a lower replacement rates from their own-annuities, but this is only the beginning of the story. The gap is narrowed substantially by the flat benefit, especially for low earners. In fact, when we use actual amount earned per year by the average woman as the reference wage, and include the public as well as the private benefit, replacement rates for women with primary and secondary education climb above those for men and at higher schooling levels they are very close to that of men.

V. Joint Annuities

The impact of joint annuities on men and women

Married men are required to purchase joint annuities or joint programmed withdrawals when they retire—as in Chile but with a more generous percentage of 70% to the surviving widow. In Argentina, as in Chile, insurance companies use gender-differentiated survival tables, although a law to require unisex tables has been under discussion since 2000. We estimate how much men's benefits are reduced and widow's benefits are increased by the joint annuity, and how this situation would change if unisex mortality tables were required. Table 5.9 reports these results for men retiring at age 65 and women retiring at 60.

Male payouts fall by 21% when a joint annuity is purchased (row 3 versus row 1)—more than in Chile because of the larger survivor's percentage as well as the greater gender difference in life expectancy. Women are also required to purchase joint pensions, but when they do so their own annuities fall by only 5%—because they are likely to outlive their husbands, hence the survivor's benefit costs little.

One of the controversial issues is whether to use unisex or gender-specific mortality tables when calculating annuity payouts. For single men and women purchasing individual annuities, gender-specific tables exacerbate the differences stemming from differential accumulations, and produce much larger annuities for men. When unisex mortality tables are applied this disparity is narrowed: the payout falls by 9% on individual male annuities and rises by 7% on individual female annuities (rows 2 versus

1, 6 versus 5). But as in Chile, the switch to unisex tables produces practically no impact on payouts from joint annuities (compare row 4 versus 3): payouts fall by only 1% for men and rise by 3% for women (Figure 4). The controversial unisex issue largely disappears for countries that mandate joint annuities.

Women receive the joint annuity after their husband's death. It is far greater than their own annuity plus their flat benefit plus the widow's flat benefit; i.e. on a monthly basis it outweighs all other pension sources for widows in every schooling group. It also provides an income for widows who have not worked in the market and therefore have little or no pension of their own. It is a partial response to the problem of women with low contributory histories—and doesn't cost the public treasury any money.

The combined household income after the husband's death is 78% of the previous income, which allows widows to raise their standard of living, given the usual assumptions about scale economies (row 9). Is this the best allocation of these public and private resources? The money spent on the widow's flat benefit (which is 70% of her husband's flat benefit), for example, could alternatively be spent on benefits while both spouses were alive or redistributed across income classes or used to reduce the required contribution rate. This is an example of the difficult decisions about priorities that need to be made.

VI. Lifetime Benefits and Imputed Taxes

In Argentina women can retire and start collecting their own annuities at 60 and highly educated women who have worked and contributed for 30 years also start receiving the full flat benefit at that time. Women with 10-30 years of contributions are not eligible for the full flat, but are eligible for the reduced flat, beginning at age 70. Men retire with the full flat at 65. Their widows start the joint annuity and the widow's flat benefit 16 years later, on average. To compare benefits in light of all these differences in starting and ending ages, it is necessary to shift to a lifetime basis. Lifetime analyses are more favorable toward women than are monthly analyses, because women live longer, retire earlier and therefore collect the benefits for more years. We examine lifetime

benefits and also lifetime costs, to see who is receiving redistributions and who is paying, on balance.

Gross benefits

Table 5.10 presents the expected present value (EPV) of the lifetime own-annuity, flat benefit, joint annuity and widow's flat benefit, whose monthly values were reported in previous tables--as evaluated by the worker at age 65. We use the same 3.5% rate to discount the stream of retirement benefits that we used for the annuity calculation during the payout stage.

For men, the lifetime present value of the flat benefit is smaller than the value of the annuity but still substantial, and relatively large for low earners (compare rows 1 and 2, also row 7). This contrasts with Chile, where the average man is above the MPG level and therefore gets no public benefit. Unlike Chile, Argentine men get a widow's benefit (70% of their wife's joint annuity and 70% of her flat benefit), but their expected present values are tiny, given their small amounts multiplied by the small probability that he will outlive her. The opportunity cost of the joint annuity that married men must purchase is much greater than the widows' benefits they receive—a 21% reduction in payouts from the individual annuity. Although the proportionate reduction is the same for all schooling groups, this produces a greater absolute cost for highly educated men, whose widows in turn receive a higher benefit (rows 4 and 8). This is a larger cost than in Chile because of the higher survivors benefit and greater female longevity advantage in Argentina. As in the case of Chile, for some households this mandatory insurance simply replaces life insurance that the husband would have provided for his wife on a voluntary basis. But for husbands who would have acquired less insurance voluntarily, the joint annuity requirement represents a real cost of foregone consumption.

Turning now to the average woman: the lifetime value of her own-annuity is larger than her fund accumulation at retirement age 60, because we are now viewing the present value of benefits from the vantage point of age 65. The lifetime value of the public benefit is smaller than that of men in absolute terms, but is much larger for women relative to their own-annuities. Women in the top educational category, of course, get a larger lifetime own-annuity and they also get a larger lifetime flat benefit than women with less education, because they work more, contribute more and are eligible for the full

flat starting at age 60 (rows 9 and 10). This is a sharp contrast to Chile, where women in the top educational categories get no public benefit. But the reduced flat benefit that less educated women get at age 70 represents a much larger proportional lifetime increment to their own annuities (row 15 and Figure 5). It is largest of all for ten-year women. The lifetime value of the joint annuity, in turn, exceeds the flat benefit, even though it starts much later, for most educational and labor force attachment groups (rows 13 and 17 and Figure 6). It plays an even larger role than it did in Chile, because it is a larger percentage of the husband's pension and the widow gets it for more years, on average.

Taking all transfer payments as a group--the flat, widow's flat and joint annuity--they roughly double the total retirement income of women in the top educational groups and treble retirement income in the bottom groups. For full career women the percentage increase is somewhat smaller since and for ten-year women larger. They greatly raise the gender ratio of lifetime retirement income to over 65% for the average married woman and over 100% for full career women (Figure 7B). The joint annuity plays a major role in accomplishing this.

Net benefits

The expected present value of the annuity is exactly equal to its cost--the accumulation in the accounts. In that sense, there is no net benefit to the individual, over his or her lifetime. The joint annuity generates a net benefit to wives and a cost to their husbands--benefits and costs are internalized within the family.

The flat benefit and widow's benefit, however, are financed out of the government's general budget so each individual and family has a positive or negative net public benefit after these tax costs. Clearly, the total imputed tax is much greater than that in Chile, because of the greater cost of the flat benefit in Argentina. Unfortunately, we don't know the actual distribution of the tax burden. However, if we assume that each cohort pays its own bill and within each cohort taxes are distributed proportional to lifetime earnings which is proxied by annuities, then individuals who get an above-average percentage increment to their own annuities gain positive net benefits while those with below-average percentage increments pay. From Table 5.10 we see this means that most men pay more than they receive (with the exception of the bottom schooling group). In contrast, most women receive more than they pay. Major exceptions here are married

women in the top educational groups who pay a net tax to finance the net benefits received by women who work and earn less, and single women with middle and higher education, who pay a net tax to help cover the cost of the widow's flat benefit that married women receive.

Perhaps most interesting is the large net benefit that goes to women who work only ten years. Because they work less than average women, their earnings and taxes paid are smaller, yet they receive the same flat and widow's flat benefits. Members of this group, with limited labor force attachment get, by far, the highest return for their very limited contributions and tax payments. At the same time, women who work even slightly less than ten years get no public benefit.

Should eligibility requirements be tightened to economize on costs or eased to expand coverage? Both these measures are problematic. On the one hand, without access to some public benefit many women would find themselves in dire financial straits when they grow very old. This would hold particularly for those who are divorced or whose husbands are not covered by the system and do not have other savings. On the other hand, many ten-year women come from middle or upper class households and are living far from the poverty line. The rationale for giving them a large subsidy is not clear. Besides the equity considerations, this pattern of redistribution may discourage work. One way out of this dilemma is to eliminate the ten-year requirement but make the flat benefit proportional to years worked and buttress it with a modest means-tested non-contributory benefit, financed out of general revenues.

In sum, this analysis of lifetime benefits shows clearly the redistribution through the flat benefit to low earning women and women with partial labor force attachment, away from men and high earning full career women. Argentina needs to think through whether this is its desired pattern of redistribution and whether it can collect the taxes needed to finance it.

VII. Who Gained (or lost) the Most from the Reform?

Did women benefit or lose from the pension reform? Since on a priori grounds we could argue in both directions, we use empirical evidence and simulations to investigate

this question. We apply the lifetime benefits estimated above for the new system, compare with simulated lifetime benefits based on the old system formula and ask: (1) Who gained or lost the most from the reform? (2) Did gender ratios get larger or smaller in the process of the reform?

Methodological problems

As discussed above, the old system was non-sustainable and unable to provide the promised benefits. In fact, the Argentine government was already defaulting on its payments to pensioners, one of the factors that discredited the old system and built political support for change. We don't know how solvency would have been achieved if the old structure had been maintained. For that reason, we do not compare absolute benefits under the new and old systems, but instead we compare relative positions of various gender-educational groups *ex ante* and *ex post*. Implicitly, we are assuming that fiscal adjustments to the old system to keep it afloat would have maintained relative positions intact, and we are using this as our counterfactual.

Additionally, in Argentina it is difficult to define the old system because several different sub-systems co-existed, fragmented along occupational and industrial lines, the rules as written down sometimes differed from the rules as implemented, and interpretations changed frequently (cuts due to fiscal exigencies, increases due to political pressures and lawsuits). The new system is also in flux, in ways that we indicated above. Therefore, it is impossible to make actual pre-and post reform comparisons in Argentina.

Instead, in Table 5.11 and 5.12 we present a stylized picture of an Argentine-type system pre-and post-reform which captures the most important design features we wish to explore: 1) in the old system women had to give up their own pension to get the widow's pension;³⁵ 2) in the new system they could get both their own annuity and the joint annuity; (3) in the new system they also get the full flat benefit with 30 years of contributions or the reduced flat with 10 years of contributions and these contributory years could not be declared *ex post*. In other words, because it is uncertain whether they will continue, we are not including in this comparison the eased eligibility requirements or the recent minimum pension that have favored low earners and low contributors; (4) we do include the minimum pension that existed in the old system just before the reform;

(5) because of the great uncertainty about inflation and indexation, we abstract from inflation, which is the same as assuming price indexation of all benefits.

How gender ratios changed due to the reform

In Table 5.11 we present gender ratios in the new and old systems, to see how they changed under the reform. If ratios are 100% in the top panel of Table 5.11, this would indicate that the lifetime benefits promised to men and women were equal in the old system, and the bottom panel does the same for the new system. When we compare gender ratios for single women with average work histories before and after the reform, we find they have risen--substantially for low earners, marginally for high earners (compare row 1 versus 6 and 7). However, for married women gender ratios in the new system jump way ahead in all educational and labor force attachment groups, more uniformly and broadly than in Chile, because of the widow's benefit and generous joint annuity provisions (rows 2 and 4 versus 8 and 10). For full career married women lifetime retirement income exceeds that of men in the new system, but not in the old system (row 10 versus 4). But the biggest improvement is experienced by ten-year married women, whose gender ratios almost doubled (row 11 versus 5).

Ratios of post-reform to pre-reform lifetime benefits, normalized

To pin down the impact of the reform on various sub-groups more precisely, Table 5.12 compares the female/male ratios of expected present value post-reform to expected present value pre-reform for each of the sub-groups considered. As in the case of Chile, we normalize according to the ratio for married men in the top educational group. Thus, a value greater than 100% indicates that the relevant sub-group has gained proportionately more (relative to their old system benefits) than highly educated married men, while a value less than 100% indicates that the sub-group has lost in relative position. This allows us to compare relative gains or losses from the new system for different groups, without fixing their absolute gains or losses (see Table 5.12 and earlier discussion for formal definition).

The first thing we notice is that virtually all sub-groups improved their position relative to high-income men, i.e. practically no ratios are less than 100%. Second, for every educational category, women gained more than men. Third, for both genders, those with the least education (lowest earnings) gained the most (Figure 8B). This is due to the

influence of the flat benefit, as well as the shift to an investment-based system in which workers with flat age-earnings profiles are not penalized. We found this picture in Chile, too. However, in Argentina relative gains by the bottom educational groups are larger and broader, because the flat benefit is so much larger and reaches far more workers than Chile's MPG. Fourth, as in Chile, single men gained more than married men, due to the financing rules for the joint annuity. Perhaps most striking is the large relative gain registered by ten-year women compared with full career women--a sharp contrast to Chile, where ten-year women lost out relative to men and full career women were the biggest gainers (Figure 9). This is due to the smaller individual account and larger public benefit in Argentina, which is not linked to contributions and boosts women with limited labor force attachment.

The main message from Argentina:

Despite many features in the old system that seemed to favor women—a high replacement rate for only ten years of work and early retirement age without an actuarial penalty—women have gained relative to men due to the reform. This stems mainly from the equalizing impact of the flat benefit and widow's flat benefit, the intra-household transfer from the joint annuity, and the fact that women do not have to give up their own benefit to receive it. Also playing a role is the heavier weight placed on early contributions due to compound interest in the new system, and the removal of advantages for men for their steeply-rising wage profiles in the old system.

The Argentine case, in which ten-year women are heavily subsidized, forces us to confront difficult policy issues about priorities. How closely connected should the public benefit be to work and contributions? Should public benefits be targeted toward retirees with low earnings due to few years of work or toward those with low earnings due to low rates of pay despite long years of service? If women with transient labor market attachment are subsidized to avoid poverty, should that objective also imply subsidies for women who haven't worked in the formal labor market at all (perhaps though a non-contributory program)? If low density of contributions, which implies low capacity to collect taxes, is a root problem that leads to non-contributory benefits, how will the government get the money to pay these benefits in addition to financing other public services? Or will its efforts to collect higher taxes simply exacerbate the incentive to

evade and lead to still lower contribution density? Should family income and other sources of individual income be taken into account in targeting redistributions (since many women who chose not to work in the market did so because other family members supplied financial support). The Argentine government is now grappling with these policy questions and we return to them in a later chapter.

Chapter 5: Mexico

Mexico, like Chile and Argentina, decided to reform its pension system as part of a broader set of market-oriented reforms designed to spur economic growth. In 1997 Mexico replaced its old traditional pay-as-you-go defined benefit system with a multi-pillar system that included a funded defined contribution component. Mexico's population is younger than that in Chile and Argentina, so the contribution rate in the old system was still very low, the benefit rate high and immediate fiscal pressures were less pressing. However, projections showed that the contribution rate would have to be raised and benefits cut substantially in the medium term. Structural change was seen as the best way to plan for future demographic changes and prevent a mounting fiscal obligation.

Although less than half of all workers contribute to and an even smaller proportion of older people get benefits from the formal system in Mexico, for these individuals the social security benefit is the mainstay of income in old age. Moreover, given the strength of the family system in Mexico, the pension given to an old person reaches many other family members as well. Among those households where a pension is received, it often constitutes half of the total household income, and this includes many multi-generational extended families (Parker and Wong 2001). In such cases, it may facilitate school attendance for children and help buffer periods of unemployment for prime-age adults. Additionally, affiliation with the social security system brings with it health care coverage, including coverage for spouses and parents.

The probability of affiliation is twice as high for men as for women (AISO 2005). Among people receiving pensions, three-quarters of the men receive their own pension while over two-thirds of the women receive pensions by virtue of being widows or surviving parents (Table 1.2). Similarly, among older people receiving health benefits, half of the men are retired affiliates, while over three-quarters of the women are wives or parents of members. Thus, these formal social security arrangements ultimately reach over half of the Mexican population, but they reach men and women in different ways. When the structure of the system is changed, it is important to figure out how the costs and benefits are distributed and how it may affect the behavior of workers and their family members, including their incentive to participate in formal market work.

I. The Old and New Systems and Our Data for Comparing Them

The old system

The main social security institutions in Mexico are the Mexican Institute of Social Security (IMSS) for private sector workers and its counterpart, the Institute for Social Security and Services of the State Workers (ISSSTE), for public sector workers. These are long-standing institutions, with IMSS created in 1943 and ISSSTE in 1959. Benefits provided include pensions, medical care and housing credit. Affiliation in IMSS is mandatory for all salaried employees, although a large non-covered informal sector exists. We focus on the scheme for private sector workers, which was the first to reform.

Prior to 1997, IMSS provided a defined benefit pension plan with a complex formula that was designed to protect short-term and low earning workers in addition to higher income long term workers. Eligibility for benefits required ten years of contributions, as in Chile and Argentina. The formula paid a proportion of the base salary for the first ten years plus an increment for every year over ten. The proportion of base varied negatively with wages, ranging from 13% for high earners to 80% for low earners. The accrual rate for additional years varied positively with wages, ranging from .56% to 2.45% per year. Moreover, the monthly pension was paid for 13 months instead of 12. Thus, a low earner could get 88% of his base salary after contributing for only ten years and relatively little for additional years thereafter. In contrast, a high earner got only 14% of base for ten years but 70% after working for 30 years. Given this formula, low earners had a high incentive to work in the formal sector for ten years, just long enough to qualify for benefits, and then move to the informal sector to avoid contributing.

Besides benefiting from a high replacement rate, low earners were also protected by a minimum pension that equaled the minimum wage, neither of which were automatically indexed to the price level. The value of this protection therefore varied widely depending on the rate of inflation and the lag before the minimum pension caught up with rising prices. In 1997 it was about 40% of the average wage.

The base salary was the average of earnings during the last 250 working weeks. High earners benefited from this base because they were likely to have steep age-earnings profiles and therefore got a large pension relative to their lifetime wages and

contributions, while the opposite was true for low earners. Widows received 90% of their husband's pension in addition to their own pension. Unlike Chile and Argentina, retirement age was 65 for both genders. (For further details see Tables 6.1 and 6.2).

These benefits appear very generous, and in a non-inflationary context they were indeed so generous as to be non-affordable in the medium term. However, affordability was achieved, in part, by inflation without indexation. High inflation meant that the pensionable wage base (the average of the last 5 years salary, unindexed) was very low in real terms. Also, the pension was not indexed for inflation after retirement. Thus, 80% of the pensionable base may have been only 40% of final year salary upon retirement, and 20% after a few years. This particularly posed a problem for women, whose work may have been done many years in the past at low nominal wage rates and who lived longer into the future than men.³⁶

These benefits were financed by an 8.5% contribution rate, of which the worker paid 25%, the employer 70% and the federal government 5%. Although it is generally believed that the employer's share tends to be shifted to workers in the form of lower wages, the costs were effectively hidden from the workers' view. In any event, costs were quite low given the young structure of the population, the small number of retirees and the failure to index benefits for inflation. But pensioners and expenditures were projected to increase rapidly in the future. Partially to prepare for this, a mandatory saving plan (SAR) was instituted in 1992. Employers were supposed to contribute 2% of the workers' salary into the workers retirement savings account. However, SAR was never effectively implemented. (See Grandolini and Cerda 1998 for further details about SAR and the problems of the old system generally).

The new system

Mexico's new system, like Chile's and Argentina, includes a funded privately managed pillar and a public safety net. The private pillar, like that in Chile and Argentina, is a defined contribution mandatory saving plan. The public benefit, like Chile's and Argentina, is targeted toward low earners but, unlike that in the other countries, is structured to reward formal sector work and therefore provide work incentives to this group. This structure has major implications for women—it encourages them to enter the formal labor market, thereby becoming more financially independent,

but it provides little protection for those who don't work regularly. Thus, Mexico's public benefit presents a sharp contrast to that in Argentina and brings to the fore the question—how should policy ensure a reasonable standard of living for today's older women who have not fully participated in the labor market, while also encouraging today's young women to work and save for their own old age?

Under the new system rules, 6.5% of the workers' wage is deposited into his or her personal account (5.15% paid by the employer, 1.125% by the worker and .225% by the state). Workers have a choice among investment managers (AFORES—Retirement Funds Administrators), with whom they place their accounts. As in Chile and Argentina, investment options are severely restricted, to limit risk and disparities among workers. Workers—both men and women—can retire at age 65, at which point they choose between a gradual withdrawal and an annuity. In this analysis, for expositional simplification, we assume retirees choose annuitization and get back their entire accumulation, plus the risk-free interest rate, over their expected lifetimes. Workers are also allowed to take 10% out of their accounts every 5 years, if unemployed. Thus, the accounts serve the dual purpose of unemployment insurance. Survivor's and disability insurance are also provided, out of a separate contribution. We focus on the old age insurance in this chapter and we assume that nothing has been taken out for unemployment.

The accounts in Mexico are smaller than those in Chile and Argentina, and small accounts pose particular problems because of fixed administrative costs per account (Disability and survivor's insurance is financed out of a separate contribution, unlike Argentina). These fees have been declining through time. Initially they totaled about 1.9% of wages, leaving a net of 4.6% for investment (compared with 10% in Chile and 7.75% in Argentina) and we use this number in our simulations. By 2005 they were only 1.4% of payroll (James et al 2000 and 2001; AIOS 2005). The reduction in fees will leave a larger amount to be invested, hence will increase accumulations and annuities by about 10%, but will not alter the gender ratios on which we focus. The small contribution rate will have a negative effect on pension amounts in Mexico. However, for women this is offset by their later retirement age—equality with men at age 65. As we saw earlier, these additional 5 years effectively raise women's pensions by 50%.

Additionally, employers are required to contribute 5% of payroll to a housing fund, INFONAVIT, from which workers can borrow to purchase a home. The balance left in these accounts is added to their retirement accounts at age 65. INFONAVIT is managed publicly and has earned low rates of interest, below the inflation rate, so the balance left is unlikely to be large.

The public benefit in Mexico takes two forms: First, the federal government contributes a uniform amount per day worked into each worker's account—the “social quota” (SQ). The SQ goes into the accounts of workers, is invested by their AFORES and eventually becomes part of their annuity. The SQ was initially set at 5.5% of one minimum salary, or about 2.2% of the average wage. It is indexed to the consumer price index so will fall through time as a percentage of the average wage as productivity and wages grow. It is a variation of the “flat” benefit concept—but flat per day worked rather than per worker regardless of days worked. Unlike the on-off switches for eligibility used by Chile and Argentina, Mexico's SQ is proportional—workers who work more, get more. This structure was designed to increase the pension levels of low-income workers while also increasing the incentive for informal sector workers to formalize their work. At this point it is not clear whether it is having that effect.

Second, the government guarantees a minimum pension (MPG) from the accounts. Initially this was set at one minimum wage (33% of the male and 46% of the female average wage), which is a generous guarantee compared with the MPG in Chile. However, this will fall through time as a percentage of the average wage since Mexico's MPG, like the SQ, is indexed to prices. Costs were controlled in another way that is significant for women: to be eligible for the MPG, 24 years of contributions are required, in contrast to the 10 years that were required for eligibility under the old system. As we shall see shortly, this high eligibility requirement effectively excludes most women. Both parts of the public benefit are financed out of general revenues.

Securing approval for a pension reform is always a politically difficult task. To pass the Mexican reform the government had to guarantee that no worker would be adversely affected by the change in system. The government also wanted to economize on its transition costs—the payment to current workers for service under the old system. To accomplish these goals, the government required that all workers join the new system

without compensation for past service, but it gave them the right to switch back to the old system rules when they retire if they would have fared better under these old rules. Upon retirement, the defined benefit is calculated that they would have gotten if they had continued contributing to the old system, it is compared with their new system annuity, and they choose the larger sum. Older workers are likely to choose the old system option because their accounts will still be small when they reach retirement age.³⁷ Younger workers will stay in the new system, providing the rate of return that they earn is high enough to give them a superior pension. New entrants to the labor force do not have the option to switch back and enter the old system—their fate rests with the new system. We avoid this switch-back option, whose value depends largely on the inflation rate during the retirement period, by projecting future pension benefits for young workers today who never belonged to the old system. Our calculations and measured comparisons assume 0 inflation.³⁸

In sum, the old system had certain features that were expected to help women, who tend to be low earners—modest eligibility requirements for a high replacement rate, a minimum pension and generous widows' benefits. But it had other features that hurt women, such as a pensionable wage based on last 5 years' earnings and the absence of indexation of the pensionable wage or the pension itself in a highly inflationary environment. The new system eliminated most of these features, both positive and negative for women. It retains a public benefit (the social quota) targeted toward low earners, proportional to their work, and a minimum pension, but with 24 years of contributions required for eligibility for the latter. We follow with an empirical analysis of how women are projected to fare relative to men, under the reform.

Data

As in the previous chapters, we start with household surveys that provide data on the gender, education, and current wage of each household member. Our data come from the 1997 Mexican National Employment Survey (ENE-97) completed by INEGI (*Instituto Nacional de Estadística, Geografía e Informática*), the Mexican Statistical Bureau. The sample contains information on 119,405 individuals aged 12 or older. For purposes of this paper, we use the sample corresponding to more-urban areas (communities of 100,000 people or more), which constitutes about 78% of the sample.

This survey contained the standard employment survey questions, plus a module with employment history and job training questions. The ENE97 yields information on age and sex of the employed and unemployed population, position at work, main occupation, hours worked, labor income, form of payment, and benefits received. Unfortunately, it does not allow for the identification of social security affiliates and/or contributions made to retirement plans.

We use these data to construct the work histories of men and women with differing educational attainments and labor market attachments. For each age-gender-education cell we calculate the probable number of years worked and the average wage earned. Wages reflect pay for full time plus part time work in each cell. We use 5 different educational categories, although these are more concentrated at the lower end than was the case for Chile and Argentina. More than half of the sample has 9 years of education or less. For women we use three different degrees of labor force attachment—the “average woman” who moves through life working like the average woman in each age-education cell, the “full career woman” who earns woman’s wages but works as much as men, and the ten-year woman who works full time for ten years ages 21-30 before having children and then permanently withdraws from the labor market.

We assume these age-specific work and wage propensities remain constant through time for each educational category. However, as women acquire more education they will be moving into higher work and wage categories. Therefore, in the aggregate, their earnings and pensions will improve more than that of men, whose labor force participation varies less with education. Moreover, as women are induced to work more within each educational category as a result of exogenous social change and endogenous incentives from the new pension system, they will move closer to the “full career” category. Therefore, the typical female today may be personified by the “ten-year” woman with 9 years of education, but the typical female tomorrow may be more like the “full career” woman with some post-secondary education. We do not need to model the woman who raises her retirement age to equality with that for men, since both genders already have the same normal retirement age of 65 in Mexico.

Years of work and contributions

We estimate work experience based on current employment of the more-urban population in relevant age-education cells. As in Argentina, our “average” data include affiliates as well as individuals who never affiliated to the system. Therefore, these data may understate work propensities among affiliates. Longitudinal data on contribution propensities of affiliates are not available for Mexico, as they are beginning to be for Chile. However, we know that density of contributions is very low in Mexico, where the informal sector is large. Fewer than 40% of all affiliates contribute in any given year, which means that when they retire they will have small accumulations (AIOS 2005). Years of work may approximate fund accumulations for affiliates who contribute regularly when working, but overstate accumulations for low-density affiliates. Therefore, as for Argentina, we present our main calculations for pensions based on the assumption that affiliates have the same work pattern as non-affiliates and contribute regularly when they work. And we also present calculations for low-density affiliates who contribute only 60% of the time that they work. Of course, this reduces their pension substantially, but it does not change gender ratios of accumulations, annuities or access to the SQ.

Men in Mexico report greater labor force participation than in Chile or Argentina—43-45 years, by the time they reach retirement age. Women, however, work less than 24 years, except at the post-secondary level where this number rises to 32 (Table 6.3). This immediately tells us that most women will not be eligible for the minimum pension under the new rules, while they would have been eligible under the old rules. It also tells us that low earning women will have an incentive to work an extra few years to qualify. The gender gap in years worked is largest at the low educational end but even at the high end it does not disappear. In general, women work half as much as men. Even though retirement age is 65 for both genders, participation rates drop off after age 60, especially for women.

Earnings

We estimate an average wage for each sex-schooling cell, using 5-year age grouping. Male wages rise with age until age 50-60 for the lower educated groups, 65 for the top education categories. Women’s wages follow a similar pattern but with a less steep trajectory (Table 6.4). The combination of lower wages and lower work mean that

pensions that are tied to contributions will probably exhibit a greater gender gap than either work or wages separately. But it is also notable that wages grow much more rapidly for the top educational group than the bottom—for men about 1% per year at the bottom and over 3% at the top end. In middle age and later the wage gap between the top and bottom educational categories is much larger than the gender wage gap, and will probably lead to a large pension gap between high and low earners. While reducing the gender and educational pension gaps are not contradictory goals (in fact, they overlap to some extent), policy-makers may need to make trade-offs about which is most important, which is a priority need for public resources.

II. How Women Fare--accumulations and pensions from their own accounts

Fund accumulations

As discussed above, we assume that a contribution rate of 6.5% of wages is put into the account of each worker and of this 1.9% is spent for administrative expenses, leaving a net amount of 4.6% for investment. Since administrative costs will probably be lower in the future, this understates the absolute amount of the accumulation by 10% or more. On the other hand, we assume that the full 5% contribution to INFONAVIT, with 0% interest, is put into the worker's account upon retirement, increasing the total by about 25%. Since much of the INFONAVIT fund will, in fact, be spent on housing, this assumption likely overstates the retirement accumulation. To a large extent, the overstatement and understatement will cancel each other out. In any event, they affect the balances of men and women by similar proportions, so should not bias the gender ratios. Initially we do not take into account the government's contribution in the form of the SQ; we focus only on the contribution that is tied to the worker's own wage.

By applying these net contribution rates to the average wage and work patterns in Tables 6.3 and 6.4, we calculate the expected retirement accumulation for each type of worker (5 educational types and 3 degrees of labor force attachment for women). In our baseline scenario we assume that the real rate of return on investments is 5% (3.5% during the annuitization stage) and economy-wide wages grow at 2% per year, in addition to the age-earnings growth described above. In our slow growth scenario the rate of

return on investments is 3% during accumulation, 1.5% during payouts, and economy-wide real wage growth is 0. Given the portfolio restrictions that exist throughout Latin America, men and women can be assumed to earn similar rates of return.

It is easily predicted that women will accumulate less than men and indeed that is the case. The pattern is very similar to that in Chile. “Average” women accumulate 30-50% as much as men with the same education (Table 6.5, row 8).

We examine the effect of varying the work and contribution behavior of women in three ways: 1) full career women--whose higher participation rates mirror the participation of men; 2) ten-year women, who work only ten years during their life, at ages 21-30, prior to marriage and childbearing; and 3) low density workers, who contribute only 60% of the time they work. Given that future cohorts of retiring women will have more years of education than current ones and will work longer, full career women are suggestive of patterns that might occur in the future. They are also indicative of single (never-married) women today. The simulation of a 10-year working career for women is particularly important for Mexico, because the old social security system had a requirement of 10 years of contributions to qualify for the minimum pension and many women worked only ten years.

As in Chile and Argentina, the gender ratio of accumulations would be greatly raised—to 60-76%--if women worked as much as men (row 9 and Figure 1C). For women in the lowest educational categories, who worked the least, accumulations are doubled when they work full career, while for women in the highest educational categories accumulations increase by only 34% because they already work most of their adult lives. Thus, incentives that encourage this behavior will go far toward reducing the gender pension gap, especially at the bottom end. When women work full career they are also likely to get higher wages than those with interrupted careers. Higher wages are, in part, a return to greater experience and anticipated future tenure. We do not have the longitudinal data that would be needed to measure this wage effect. Instead, we use the same monthly wage for women regardless of their labor force attachment. Since we have taken away the effect of different labor force participation between men and women in measuring the accumulations of full career women, wage differences between the genders must account for the remaining fund gap of 24-40% (compare rows 9 and 10).

Women who work only ten years accumulate only 15-18% as much as men. Low-density women, who contribute only 60% of the time they work, have an accumulation approximately equal to that of ten-year women (rows 1 and 6, 7)

Expected pension benefits

Upon retirement, workers in Mexico have a choice between gradual withdrawals and annuities, but we assume the latter in order to get a stable annual flow. Payouts on annuities depend on survival probabilities, and in Mexico insurance companies are allowed to differentiate between life expectancies of men and women. Male and female life expectancies at 65 are projected to be 15.9 and 19.8 years, respectively. Since we have no data on differential life expectancy by years of education, we adopt the same life expectancy for all education groups. Men and women are required to purchase a joint pension with 60% of their monthly benefit going to the surviving spouse; later we compare this joint annuity with the higher payout that would have obtained from an individual annuity. We assume that on average, women marry men who are 3 years older, thus wives survive their husbands by about 6.5 years.

In our baseline case, projected monthly annuities for men based on their own contributions (no SQ) vary from \$267 to \$822 in 2002 US\$'s. For those with a 60% density the annuity amounts falls proportionately. For average women, projected annuities are 30-50% as much as their counterpart males (Table 5.6, rows 1, 2, 3 and 7). This is approximately the same gender gap that we found in Chile, and much smaller than that in Argentina, despite the fact that the gender gap in employment is larger in Mexico. Mexico's equal retirement age offsets its greater difference in work histories and narrows the gender gap in pensions. The gap is narrower for full career women and broader for ten-year women (rows 8 and 9). Since low density men and women are both assumed to get only 60% of the full amounts, gender ratios are unchanged (compare rows 7 and 10).

Notice that the annuity differential is almost exactly the same as the accumulation differential, suggesting that longevity distinctions between men and women add practically nothing to this gap. This is because we have used joint annuities and both genders have the same retirement age. We will return to this point below. As we suspected earlier, the pension gap between the bottom and top educational categories is also large, and it is especially large for women, because of the positive correlations

between education, wages and years of work—women with the least schooling get only 19% as much as women with the most schooling.

III. The Social Quota and Minimum Pension

The social quota (SQ)

In reality, payouts are expected to be much larger than those we have just described, and the reason is the social quota. In 1997 the SQ was set up to add 5.5% of the minimum wage, or 2.2% of the average wage, to each workers' account—a flat government contribution per day worked. It was price-indexed, so maintains its real value. It is similar to Argentina's flat benefit in the sense that it redistributes to low wage workers and equalizes pensions across gender and educational groups much more broadly than does Chile's MPG. But it was designed to overcome two disadvantages of Argentina's flat benefit. First, it is pre-funded, thus does not build up a large future government obligation. Each year, it is put into the worker's account, where the funds are privately managed. Second, it increases with years worked, so continuously encourages incremental work, rather than plateauing and then jumping discontinuously, as in Argentina.

The greatest proportional increase in monthly pension goes to the low educational categories and to women, who are the lowest earners in any category (Table 6.7 and Figure 2C). An average woman in the lowest schooling group gets a 62% increment from the SQ while her counterpart male gets a 36% increment and highly educated men and women get only an 11% and 17% increase, respectively (Table 6.7, rows 3 and 7). As a result, the SQ raises the gender ratio for all schooling levels and it also increases the ratio between pensions of the bottom and top schooling groups for both genders (compare rows 1 versus 2, 5 versus 6, 13 versus 14).

In absolute terms full career women and men get the same amount of SQ, more than the average woman gets. But this is a much larger proportional increment to the own-annuity of full career woman than men. Consequently, full career women end up getting a pension that is 70-80% as much as men, relatively more than on the basis of

their own-annuity. The more women work, the more they get and the narrower is the gender differential.³⁹

Since the SQ is price-indexed it provides valuable inflation insurance, but it will fall in value relative to wages as time passes and wages grow. Thus, it will add a smaller and smaller percentage increment over time and will become less effective as a redistributive device, as observed in the other countries. If we had done these simulations for ten years further into the future, all the percentage increments that we have given here would be reduced. In the short run price indexation is reasonable given the relatively large size of the SQ initially, but future cohorts of women will get less protection if the SQ remains constant in real value in the long run. In addition, it will provide less incentive to formalize employment and contribute, which was one of its objectives.

The minimum pension guarantee

Mexico also offers a minimum pension guarantee equal to the minimum wage. This was about 33% of the average male and 46% of the female average wage in 1997--\$133 monthly in 2002 US\$'s. It is indexed to prices. Twenty-four years of work are needed for eligibility. Average men in all educational categories are eligible but their own annuity is projected to be well above the MPG level, even with a low density of contributions. The average woman in all educational categories except the bottom one will also be above the MPG level, but by a smaller margin. Women with a low density of contributions and ten-year women will fall below the MPG. However, most of them will fail to meet the eligibility requirements.

In view of the low contribution rate in Mexico, it may at first seem surprising that own-annuities are projected to be above the pension floor, which is 33% of the average male wage. The main reason is that the MPG is price-indexed rather than wage-indexed. By the time today's young worker retires, the MPG will be only 16% of the average male wage, given our assumed 2% economy-wide wage growth, and it will be a smaller percentage of his final year's wage, given positive age-earnings growth. If the MPG were wage-indexed, average women in most educational categories would find themselves below the pension floor. Thus, the MPG may provide a safety net today but the net will be placed relatively low, compared with the contemporaneous standard of living, when today's young workers retire, if it remains price-indexed.

The SQ and minimum pension under the slow growth scenario

We tested the sensitivity to our assumptions about interest rate and rate of wage growth by simulating a slow growth scenario in which the rate of return is 3% during the accumulation stage, 1.5% during the payout stage and the rate of real wage growth is 0. Of course, this slows down the growth in accumulations and annuities from the workers' own contributions. It increases the stabilizing role of the SQ, which remains fixed in real value as the own-contribution falls. In this sense, the SQ provides insurance against slow wage growth. But, since it goes into the worker's account and is invested, it does not insure against the low interest rates that are often part of a slow growth environment. Therefore it has only minor effects on gender differentials and high/low educational differentials, compared with our baseline fast growth scenario (compare Appendix Table 4 with Tables 6.5 and 6.7).

More important, when wage growth is 0 due to slow growth, a price-indexed minimum pension is equivalent to a wage-indexed minimum pension, so the MPG becomes much larger relative to the workers' own annuity. Average women in all educational categories except the top one now fall below the MPG. However, most of these women fail the eligibility test—they don't have 24 years of work. (Of course, this may give them an incentive to work a bit more and qualify).

Dispersion in work experience

Not all men and women are "average"; there is a dispersion in work experience, as well as wages, around the mean. Some women may meet the eligibility criterion and get the top-up while some men may fall below the MPG pension level and get the top-up. Therefore, we estimated the dispersion around the average work experience by using the observed dispersion (coefficient of variation) of the accumulated years of work for each group at ages 61-65, and applied it to the mean value of number of years worked and estimated annuity. Assuming a normal distribution around the mean, we can estimate the percentage of the observations that would fall above or below a specified number of years of work and annuity value (Appendix Table 5).

Not surprisingly, the proportion of women who would fulfill the eligibility requirement is quite sensitive to number of years required. For women with the lowest education, 25% are estimated to work fewer than ten years, 48% less than 20 and 60%

less than 24 years. The numbers are quite similar in educational categories two and three. This implies that under the old system eligibility rules, only one quarter of these women would fail to qualify for the minimum pension, compared with 60% who fail to qualify in Mexico's new system. If the rules were adjusted to twenty years, as in Chile, another 12% of these low educated women would become eligible.

Some of the women who meet the eligibility requirement would not receive the benefit in any case; only those whose own-pension is below the MPG level would receive the top-up. We estimate that in the moderate growth (baseline) scenario 47% of the lowest-education women have an own-pension below the MPG level, compared to 4.3% of the women with highest-education. It is likely that there is a positive correlation between the total number of years worked and the amount of own-pension, so women whose own-pensions are below the minimum are probably those who worked less than 24 years and therefore are ineligible for the minimum pension guarantee.

By contrast, 100% of the men who contribute regularly when they work are eligible for the MPG, whether the years required are 10, 20, or 24. Men are less heterogeneous than women as their work careers are clustered more tightly over a much higher number of years. But in a moderate growth environment (our baseline) no men would use the minimum pension guarantee because all men have an estimated pension above the MPG level.

However, this may not be true in a slow growth environment, especially for low-density men. These men are in a similar situation to women—some of them will have pensions below the MPG, but they are the same ones who are likely to fail the eligibility requirements.

This discussion demonstrates the extreme importance of choosing eligibility criteria for the public benefit with great care. It also raises the policy issue—to what extent do we want to subsidize those women and men who have not worked in the formal labor market and contributed toward their pensions? Some of these women come from middle or upper income families, which is one reason they have not engaged in formal work. Is there some other way to maintain women's living standards as they age? We return to these questions later.

V. Replacement Rates

Since pensions are designed to replace wages at a point when the individual is too old to work, they are often compared with the wage that the individual earned, as an indicator of adequacy. It is commonly believed that women have lower replacement rates than men, because of their shorter work periods during which contributions are accumulated. Actually, the situation is much more complicated, with alternative definitions of replacement rates yielding very different results. Under some scenarios women have higher rates than men in the new systems.

A key factor in the definition is the choice of reference wage with which the pension is compared. For Mexico we use wage rates and earnings at ages 51-60, which are close to the peak period for men and women. (We do not use final year's wage because our data for later ages are biased by the non-random selection of workers into early retirement, hence their disappearance from our wage set). Pensions differ between men and women because of differences in wages and years of contributions. Since the replacement rate implicitly controls for reference wage, we expect it to be more similar for men and women than absolute benefits are, and indeed this is the case (compare the gender ratios in Table 6.7 and 6.8).

For men the annuity from own-contributions replaces 42-57% of the reference wage, and for women only 23-31% (rows 1 and 5). Adding the SQ raises these rates by 10-20 percentage points, especially for individuals with low education (rows 2 and 6). The higher replacement rates for men are, of course, due to their longer years of work and contributions.

In many educational cells, these replacement rates are larger than those in Chile or Argentina, despite the lower contribution rates in Mexico. This mainly stems from the higher retirement age for women in Mexico and from our assumption that the 5% contribution to INFONAVIT will eventually add to the retiree's pension. To the extent that this does not happen, replacement rates in Mexico will be lower than in Chile and Argentina. The replacement rate is, of course, much less for low-density workers, but relative replacement rates for men and women are unchanged (rows 11 versus 14)

Among men, replacement rates are much higher for those with low levels of education, because of the redistributive effects of the SQ. But among women, this effect is offset by the fact that highly educated women work more, so replacement rates are more uniform across educational groups. This means that the female/male ratio of replacement rates rises strongly with education, from 54% to 78% (row 11). And for full career women, who work as much as men, replacement rates reach 50-85%, exceeding those of men--a consequence of the greater importance of the SQ and flatter age-earnings profile of women (rows 7 and 12).

But actually, very few women earn the wage rate that we are using as the reference wage. In any given period the average women works less than half the time and therefore their annual earnings are only a fraction of the full time wage rate. We therefore change our reference wage to reflect actual earnings, by adjusting it for proportion of time worked between ages 51-60, similar to what we did in the other two countries. We find that the average woman with primary or middle education replaces over 100% of her earnings, and those with secondary or higher education replace 64-82% of earnings. These are much higher than the replacement rates of their male counterparts--the female/male ratios far exceed 100%--due primarily to the equalizing role of the SQ (rows 8 and 13 and Figure 3C).

In sum: women get lower replacement rates of their full time wage rates than men from their annuities, including the SQ, but this is only the beginning of the story. When we use actual amount earned per year as the reference wage, by adjusting the full wage for proportion of time worked, replacement rates for women with primary or secondary schooling climb above 100% and, at all educational levels, exceed those of comparable men. If the rationale for pensions is to replace earnings, this is the correct reference wage to use. Similarly, replacement rates for full career women are higher than those of men. When normalized by working time and actual earnings, the SQ produces a higher replacement rate for low-wage retirees and brings the replacement rates of women above that of their male counterparts.

V. Joint Annuities

Joint annuities for widows

Mexico, like the other Latin American countries, requires men to purchase joint annuities that cover their wives at 60% of their own benefit. This imposes an implicit cost on married men, while relieving single men of the obligation they had to finance widow's benefits from the common pool in the old system. Married men pay a price that takes the form of a lower monthly payout while they are alive. In Mexico, given the differences in age and life expectancy, the joint annuity requirement costs married men a 19% reduction in their own benefit, slightly more than in Chile (Table 6.9, rows 1 versus 3). Of course, for men who would have purchased life insurance for their wives in any event, the cost is much less, as mandatory annuities simply replace voluntary insurance. The widow's benefit exceeds her own pension in every educational category. It more than doubles the personal income of the average widow (compare rows 7 and 9).

Women must also purchase a joint annuity but the cost, in terms of lower monthly payouts to them, is only 5%. Joint annuities are cheap for wives to buy because, given the age and longevity differences, they are less likely to die and their husbands are less likely to survive them.

In the old system of Chile and many other countries women had to give up their own pension in order to get the widow's pension. In contrast, in Mexico women could keep both in the old system, and the widow's benefit was a full 90% of the husband's benefit. This was an extremely favorable treatment of widows; was it perhaps too favorable? Given household economies of scale, it allowed the widow to raise her standard of living when her husband died. It required young workers, whether single or married, to pay more to enable this increase in living standards for widows. The benefit was financed by the common pool, in effect by a tax, which may have made it difficult for the government to use taxes to finance other important public goods. Moreover, the largest benefits went to the highest income families, which some would regard as non-equitable.

In contrast, the joint annuity requirement can be thought of as an enforcement of the implicit family contract between husbands and wives in which the wife's time is heavily allocated toward the home while the husband provides monetary support. (This tends to be true even in households where the wife works). The widow's benefit plus her

own pension maintain the household income after husband's death at 70-74% of what it was before his death, roughly the amount needed to maintain the previous standard of living (row 11). This effectively keeps very old women out of poverty even if they were not affiliated to the social security system, so long as their husbands were covered. As before, the payment is especially large to middle and high income widows. Passing this responsibility on to husbands rather than the common pool has helped Mexico to allocate scarce public resources to other purposes, such as the SQ which heavily benefits low income men and women, or schooling and cash transfers for children from poor families.

Unisex mortality tables

We also investigated the potential impact if unisex tables were required for annuity calculations. Insurance companies will generally place their clients into different risk categories for pricing purposes, and gender is an easily observable characteristic for these purposes. The greater life expectancy of women in annuity pricing is often cited as one reason for their lower pensions. One of the controversial issues in defined contribution plans is whether unisex mortality tables should be used, as they implicitly were in the old defined benefit systems. We calculated how much difference that would make to payouts on individual and joint annuities. After the switch to unisex tables, payouts fall by 9% for single men and rise by 8% for single women (Table 6.9, row 1 versus 2, 5 versus 6). This represents a small redistribution between the genders.

However, the payouts on joint annuities are very close—they fall for men by only 2%—when unisex instead of gender-specific tables are used, as we saw before for Chile and Argentina. Thus, the unisex requirement would imply a modest redistribution from single men to single women but would leave married individuals largely unchanged (Figure 4). Although the use of unisex tables is highly contentious in many countries, it is important to realize that for joint annuities—which are the most common sort—this hardly matters. This also means that the possible distortionary impact of unisex tables (discussed in Chapter 8) will be small when joint annuities are required. Women's lower pensions stem primarily from their lower labor force participation, wages and contributions, not from their greater longevity.

VI. Lifetime Benefits and Imputed Taxes

Gross lifetime benefits

The SQ is paid to each worker throughout his or her working life, the opportunity cost of the joint annuity is incurred throughout the man's retirement period and the widow's benefit begins, on average, about 15 years after the woman's own pension starts. In order to compare these various costs and benefits it is necessary to convert them into expected present value (EPV) terms. We sum each benefit and cost over the individual's lifetime and convert to expected lifetime values at age 65 using a 3.5% discount rate—the same interest rate as applied during the annuitization period (Table 6.10).

The present value of the own annuity and the SQ are far greater for the average man than for the average woman, because he works many more days than she (rows 1 and 2 versus 9 and 10). However, the SQ adds a much larger proportional amount to the lifetime flow of benefits for average women, especially low earners (rows 6 versus 14 and Figure 5). The joint annuity adds even more than the SQ to most woman (compare rows 10, 14, 20 and 25 to 11, 15, 21 and 26; Figure 6). As a result, average married women get 65-85% as much as men in total lifetime benefits. And full career women get larger lifetime benefits as men. These lifetime gender ratios are much higher than the monthly gender ratios because of the greater longevity of women but even more because of the value added by the joint annuity.

Net benefits

To derive net benefits we approximate the taxes that must be subtracted to cover the cost of the SQ, as for Chile and Argentina. We assume that each cohort pays its own bill and within each cohort taxes are distributed proportional to lifetime earnings, as proxied by own-annuity. Then, those with an above-average increase to own-annuity from the SQ are net gainers, while those with a below-average increase are net losers. The percentage increments to own-annuities turn out to be much broader than in Chile and smaller in magnitude than in Argentina, with the largest going to women in the bottom three educational groups. In contrast to both Chile and Argentina, the biggest net public benefits go to full career women, who work the most; they get a higher percentage increase than men, to a larger wage base than other women have. The ethos of Mexico's

new old age system clearly is—reward work, but subsidize low rates of pay. Work incentives play a much larger role here than in our other two sample countries.

VII. Who Gained or Lost Most from the Reform?

So far we have been analyzing the new system alone. We now move to a comparison of the new and old systems from the gender perspective. As in our earlier cases, we do not attempt to compare absolute gains or losses, in view of the fact that the old system was non-sustainable in the long run, so it is difficult to establish the counterfactual. Instead, we focus on relative gains or losses. (The counterfactual in our analysis is any system with the same distributional pattern as the old system).

How gender ratio changed due to the reform

In Table 6.11 we compare gender ratios of lifetime benefits before and after the reform. A ratio of less than one indicates that the EPV for women was less than that of men—as of course it is in most cases. If the ratio in the bottom panel is greater than that in the top panel, it means that the relative position of women has improved due to the reform.

If we simply compare gender ratios based on own-annuities, without including the SQ or joint annuity, gender ratios appear to fall in the new system. However, once the SQ is added as part of the new system the gender ratio rises. For example, in the old system the ratio is 29% for single women with average work patterns and 9 years of education, while it rises to 45% in the new system with SQ (rows 1 versus 7). Results are mixed for married women—gender ratios rise in some cases but fall in others (rows 2 and 4 versus 8 and 10). The most consistent gains are registered by full career women. In the 9-year educational category, the ratio of lifetime retirement income for full career women compared with men rises from 63% to 87% for singles and from 102% to 108% for married workers (rows 3 and 4 versus 9 and 10; Figure 7C).

Ratios of post-reform to pre-reform lifetime benefits, normalized

Finally, to capture differences in relative changes by each gender, education, marital and labor force attachment sub-group, we calculate the ratio of expected present value post-reform to expected present value pre-reform for each group, normalizing

according to the ratio for married men with top education. A normalized ratio of 100% indicates that the relevant sub-group has gained (or lost) proportionately as much as highly educated married men, and the higher the normalized ratio the greater the gain in relative position (see Table 6.12 and earlier discussion for formal definition).

Many of the main results are similar to those we saw in the previous cases:

1. Virtually all subgroups gain more (or lose less) than top earning top men.
2. Both for men and women, relative gains are greatest for those with least education and earnings. This is the strongest effect. Apparently, the redistributive SQ in the new system outweighs the formula in the old defined benefit system that seemed to favor toward the poor. Additionally, compound interest in the new defined contribution system benefits those with flatter age-earnings profiles who make a larger share of total contributions early in the person's career.
3. Single men gain more (or lose less) than married men because they no longer have to finance the widow's benefit.
4. Single women with average or full career work histories also gain more than married men and even more than single men in most cases. (Women gain relatively more from the SQ, while married men must pay for the joint annuity).

However, differences also appear from our previous cases:

1. Diverging from Chile and Argentina, married women gain less than single women. The reason lies in the generous treatment of the widow's benefit in the old system. In Mexico, unlike the other countries, the widow's benefit was 90% of the husband's benefit and women did not have to give up their own pension to get it. After the reform the widow's benefit fell to 60% and the fact that women could keep it on top of their own annuity was not new.
2. Also, in contrast to Argentina, ten-year women lose position relative to most other groups, given the work-oriented nature of the SQ.
3. The biggest gainers from the reform are full career single women in the bottom half of the education distribution (Figures 8C and 9). This is consistent with the underlying ethos of the Mexican reform--to reward work while partially equalizing pensions across gender and educational groups.

What do we conclude from the Mexican case?

Despite a defined benefit formula in the old system that seemed to favor low earners and women, many hidden details had the opposite effect. In contrast, the defined contribution plans in the new systems have subtle features that favor women, such as the heavier weight given to earnings early in adulthood. These can be, and in Mexico are, reinforced by the public benefit, the SQ, which redistributes to low earners. As the lowest earners in each educational category, women will inevitably benefit from such redistributions.

We saw in Chile and Argentina that redistributions to low earners run the risk of discouraging marginal work once eligibility has been established. Mexico has come up with a method for avoiding that disincentive, by paying a flat amount per day worked; it is therefore proportional to time worked. In net benefit terms, the SQ is targeted toward those who are low earners by virtue of their low wage rates, not their low participation rates. This approach has the effect of encouraging workers to work and save for their own old age, narrowing projected gender differentials and also narrowing expected pension differentials between workers at the top and bottom of the educational ladder. If women respond to these incentives by working more, gender ratios should rise further in the future. Mexico can afford this, in part, because it shifted the responsibility for supporting widows to their husbands rather than taxpayers.

The Mexican approach, however, does not avoid poverty for older women who didn't work "enough" to benefit much from the SQ and don't have husbands who leave them large widows' benefits. The minimum pension is designed to serve this role, but eligibility conditions effectively exclude most women. Men and women with low density of contributions may be left with small pensions from contributions, small public benefits into their accounts, and lack of eligibility for the minimum pension guarantee. What are reasonable eligibility conditions for the public benefit in a contributory scheme and what arrangements will keep out of poverty women who didn't work enough to qualify for such benefits? This is a key policy issue that we discuss in Chapter 8.

Chapter 7. Gender Issues in Pension Reforms of Other Regions

At the same time that the Latin American countries were reforming their systems, the transition economies of Eastern and Central Europe and the former Soviet Union were facing huge financial strains in their systems, which required them to reform also. Kazakhstan, Poland, Hungary, Latvia, Croatia, Kosovo, Bulgaria, Estonia, Lithuania, Macedonia, Slovakia and Russia have instituted multi-pillar reforms or are in the process of doing so. Several OECD countries have also changed their systems to include a funded privately managed pillar together with a public social safety net. We have not conducted the same detailed analysis for these countries as we have for Latin America, but using secondary sources we compare these new systems with those in Latin America from a gender perspective. We present data on Poland and, to a less extent, Kazakhstan and Latvia from the transition economies, and on Sweden and Australia as examples of reforms in advanced industrial societies. This allows us to enlarge the design features that we are able to explore.

In particular, many transitional economies have a public benefit that is larger, more closely linked to contributions and less redistributive than those in the new Latin American systems. Based on the earlier chapters, we would expect this to disadvantage women. In contrast, most OECD countries offer a non-contributory public benefit or minimum benefit that is based on residence rather than employment. Our earlier work suggests that this will favor women. The joint annuity is typically not required in these countries but unisex mortality tables are required for annuitization. Thus, each region has chosen a different strategy with different costs, work incentives, benefit-contribution links and distributional effects. Finally, the wage and employment positions of women relative to men in the transitional and industrial countries are quite different from those in Latin America, with the gender gap in labor force participation rates generally less than 20% (OECD 2003). We would therefore expect--and find--different gender outcomes, as a result of different initial conditions and policies.

I. The Transition Economies⁴⁰

Old age security in the old systems

In the pension systems of the old Soviet Union and Eastern and Central Europe, the gender gap was small: Women worked almost as much as men, aided by state-provided child care arrangements as well as a social expectation that everyone would work. Women earned almost as much as men, in part because of wage compression that minimized differentials between genders and in part because the informal sector was very small. Typically, women were allowed to retire at age 55, 5 years earlier than men, but this had little impact on their benefits as full pensions (55-85% of final wage) were awarded after only 20 years of work (25 for men), credit was given for child-caring years, and the defined benefit formula did not take age or future life expectancy into account. This system was implicitly expensive, but these costs were covered by the state and did not show up as explicit taxes, and in any event the impact on labor supply of high taxes and distortionary benefit formulae did not seem to matter in a command economy.

The multi-pillar reforms

Overview. Of course, this command economy was destined to fail (in part as a result of the disincentives it embodied), and as the conversion to a market economy took place, high pension costs and unrealistic formulae did matter. As a result, practically all countries in the former Soviet Union and Eastern Europe have undergone or are now planning major structural reforms. While the details of the reforms vary across these countries, they have certain features in common: 1) a closer linkage between benefits and contributions through the adoption of a funded defined contribution pillar; 2) a public benefit that is smaller than it was before but is nevertheless (except for Kazakhstan and Kosovo) much larger and less targeted toward low earners than that in most Latin American countries; 3) a higher—but still quite low and not yet equalized--retirement age for women and men (58/63 in Kazakhstan, 60/65 in Poland, 60/65 in Croatia); 4) a benefit structure that gives lower annual pensions for early retirement and greater longevity, sometimes in the public as well as the private pillar; 5) a reduction in special privileges for women that previously existed, such as pension credits for time spend on maternity leave or child care;⁴¹ 6) a weakening and in some cases elimination of

survivors' benefits and a continuation of the old system prohibition on receiving own-pension and widow's pension simultaneously; and 7) an absence of firm decisions, so far, on how the annuity stage of the private pillar will be handled.

Privately managed funded accounts. In all cases, these countries set up a privately managed funded plan that mandated retirement saving and gave workers a choice of investment managers, much as in Latin America. While the size of these accounts vary widely, with contribution rates ranging from 2% (Bulgaria) to 10% (Kazakhstan), their structures are very similar. But their public benefit structures are very different from Latin America.

Public benefits—large and earnings-related. In practically all cases except Kazakhstan and Kosovo, the public benefit remained relatively large and was closely linked to contributions or years of work. In Hungary, Croatia, Bulgaria and Macedonia an earnings-related defined benefit plan that gives higher benefits to high earners—a smaller version of the old defined benefit scheme--was adopted for the public pillar. (In Croatia the formula was moderately progressive). In Poland and Latvia, a new form of public benefit was adopted-- a notional defined contribution (NDC) plan. This system is pay-as-you-go but it uses a benefit formula that mimics a funded DC plan. That is, the contributions of each worker are recorded in an account and credited with a notional interest rate that is set by the government, but the contribution is immediately used to pay other retirees—no money remains in the account. When the worker retires his or her “notional accumulation” is converted into a real annuity, according to a formula that supposedly takes life expectancy into account. Although they are allowed to retire early, women bear the full actuarial cost of doing so by getting a lower monthly pension. This system is discussed in greater detail in the following section on Sweden, which developed the NDC model and helped spread it to nearby countries.

Thus, the public pillar was designed as an instrument of diversification rather than redistribution. In fact, basing benefits on contributions rather than redistribution to low earners is considered “equitable” in the transition economies, which have seen many idiosyncratic and perverse redistributions—a reminder that the definition of “equity” varies with the cultural and historical experiences of a society. For similar historical reasons, rewards for work were given a high priority in these countries.

Minimum pensions. The public pillar did, however, include a minimum pension in most transition economies, as a poverty prevention safety net. In Kazakhstan, deviating from the pattern described above, the MPG (about 21% of the average wage) is the only public benefit. In Kosovo the residence-based public benefit is a flat pension pegged to the cost of a subsistence food basket. Estonia and Lithuania accompany their earnings-related public scheme with a small flat basic benefit that effectively set a minimum. Beyond that, every country provides a minimum pension guarantee that varies between 17% and 30% of the average wage, with eligibility requiring 10-25 years of contributions.

These eligibility requirements are modest in view of the high female labor force participation rates in the region. Most women will satisfy these conditions and are thereby insured against absolute old age poverty. At the bottom of the income distribution gender differentials are compressed by the minimum pension. In Poland, 70% of recipients of the minimum pension are women, a result of their relatively low lifetime earnings (Woycicka 2003). However, their high labor force participation rates also mean that the vast majority of woman will accumulate an own-pension that exceeds this minimum, so it will do little to reduce the gender gap, except for very low earners. Indeed, simulations show constant replacement rates across income categories and little redistribution beyond the bottom end, with Croatia and Lithuania being the only outliers for reasons given above (Whitehouse 2003). This is consistent with our prediction of lower pensions for and little redistribution to women. Moreover, the minimum pension is usually price-indexed, so will decline through time relative to wages and become even less applicable in the future.

Changing labor market behavior and demography of women and men

Given the close linkage between benefits and contributions and the conversion of pension savings into an actuarially fair annuity, labor force participation rates, wage rates and retirement age now matter much more than they did in the old systems. Yet, just as they began to matter, a growing gap appeared in work histories of men and women, due to changing economic and social conditions and greater freedom to adapt to them.

In Kazakhstan, Latvia and Poland participation rates in the formal labor market are now 8-10 percentage points (15-20%) lower for women than for men (Table 7.1).

Retirement age for women is typically 5 years earlier than for men. By the mid-1990's the average length of service for men was about 40 years, compared with 32-35 years for women, and the latter number is expected to drop further as a result of growing informality (Castel and Fox 2001). While these disparities are small by Latin American standards, they are large compared with earlier Soviet Union days.

Female wages are only 70-80% of male wages. Evidence from Poland indicates that occupational segregation has increased, with women concentrated in the public sector and in lower paying fields such as health and education. In contrast, males are more likely to take jobs in industry, trade and in the private sector, which pay higher wages. The gender gap in wages, too, is smaller than that in Latin America, but it is growing (Woycicka et al 2003).

Meanwhile, life expectancy for men has actually been declining in much of the region, so female life expectancy at age 60 is 5-7 years more than male life expectancy—a much larger difference than in Latin America, implying that women are even more likely to become widows. Taking into account their earlier pension ages, life expectancy for women at retirement is 6-10 years more than for men, leading to much smaller annual benefits if gender-specific mortality tables are used (Whitehouse 2003). Unisex mortality tables are used for calculating the public benefit, but it is not yet known whether they will be required for the private funded benefit. However, even if they are used, the earlier retirement age for women implies a longer life expectancy at the point when the annuity is calculated.

Consequences for the pension gender gap

Thus, reductions in female labor force participation and relative wage rates are taking place in a new system where these variables now matter. At the same time, implicit redistributions to women have decreased; for example, they don't get full credit for child-raising periods. Early retirement, which was a clear advantage in the past, is a mixed bag in the present systems as it simply trades off more leisure for less pension due to actuarial adjustments. As a result, the gender gap in pensions appears to be increasing. While detailed studies have not yet been made, estimated pension ratios for average women versus men have fallen from 95-100% under the old systems to 50-60% projected

for the new systems (Table 7.2). Also in the future more than in the past, full career women will receive larger pensions than those with less labor market attachment.

A partial decomposition of the gender gap is available for Poland that is roughly comparable to the decomposition presented earlier for Latin America (Tables 7.2). Simulations (by Chlon-Dominczak in Woycicka 2001) indicate that pensions received by average women will be only 45% as much as those of men if gender-specific mortality tables are used for annuitization. This increases to 57% if unisex mortality tables are used for annuitization and 73% if retirement age is equalized at 65 and women work 4 out of the 5 extra years. The remaining differential of 27% is due mainly to the growing wage disparities between men and women. This decomposition does not take account of survivors' benefits, joint annuity or the minimum pension, which might raise these ratios for low earners and married women (but see below).

Simulations further compare these gender ratios with much higher female/male ratios under old system rules: 81% based on current labor market behaviors and 95-100% with old behaviors. Thus, diverging work and wage patterns for men and women have led pensions to diverge by almost 20%, and new system rules have more than doubled this projected pension gap. It is sometimes argued that a large public benefit protects women. The experience of the transition economies suggests that the targeting of the public benefit matters more than its size. If the public benefit is large because it is both work- and earnings-related, it is unlikely to improve the relative position of women compared with the positions achieved by the private benefit.

Married women and survivors benefits

The position of married women will probably change even more than that of single women. In most countries in the region, survivors' benefits were reduced or eliminated by the pension reform. This was done to save money for the public treasury and to underscore the ethos of personal responsibility. The latter point of view, however, overlooks two important facts: 1) the husband probably contributed about 70% of total household income, which is lost when he dies; and 2) due to scale economies, the widow requires about 70% of previous household income to maintain her previous standard of living.

Latvia eliminated survivors' benefits for spouses entirely. In Kazakhstan the widow's benefit is small and flat, financed out of general revenues. In Poland the widow is paid a benefit from the public pillar after she reaches age 50—but when she retires at 60 she must choose between her own public pension and the widow's pension; she cannot keep both. Since the public benefit is quite large, as already discussed, this is a large opportunity cost to the widow. It depresses the widow's potential income and also the wife's incentive to work. Widows inherit part of the husband's account, if he dies before retirement. But we don't yet know if joint annuities will be required upon retirement. If not required, this would be a major blow to the lifetime retirement income of married women.

Divorce, part-timers, unisex and indexation

Many issues that will affect women have yet to be decided in the transition economies. In Poland the new system includes provision for account-splitting in case of divorce, but it is not yet clear how that will be implemented. It also extends coverage to part-time workers—disproportionately women—but this may simply stimulate part-timers to shift to the informal sector to avoid the high payroll tax rates. The possible requirement of indexed annuities and unisex tables for the private benefit are still under discussion in the region. The public benefit is usually indexed to a combination of prices and wages, which means that they will increase faster than inflation over the retirement period—a provision that is favorable to older women who live longer. But it is as yet unknown whether indexation will be required for the private benefit, or whether the insurance industry will be able to provide it, if required. Unisex tables, again, are used in calculation of the public benefit, but the decision for the private benefit has yet to be made. Given the earlier retirement age of women, insurance companies could circumvent a potential unisex rule by charging a higher price for early retirees, to achieve a higher price (lower payouts) for women.

In sum:

Details of the reformed systems matter a lot. The magnitude of the gender gap in monthly pensions is smaller in the transition economies than in Latin America, due to higher female work propensities and smaller wage disparities. But women do not benefit from transfers from the public benefit or regulations over payouts from the private

accounts to the same extent as in Latin America. In most cases the public benefit is far larger—but more earnings- and contribution-related--than in Latin America. Unlike Latin America, survivors' benefits have been reduced and the joint annuity has not become an equalizer of lifetime retirement income between the genders. Meanwhile, gender disparities in wages and employment appear to have been increasing and gender disparities in legal retirement ages remain. As a result, projected monthly and lifetime pensions for women are less than those for men in the new systems and the gender ratio is less than it was in the old systems. Older women who become widows may be faced with a declining standard of living relative to their previous life and relative to younger people around them. Equalizing retirement ages and requiring joint annuities would help avoid this outcome without costing public funds.

II. Sweden

Sweden has also adopted a multi-pillar reform. The gender impact has been analyzed by Stahlberg et al. 2006 a and b, following our methodology. We draw on that study in this section. In Sweden the labor force participation rates of men and women are very similar—in 2002 80% for men versus 75% for women. However, women are more likely to work part-time (21% of women's employment versus 7% of men's employment) and to take a year's maternal leave upon the birth of a child. Their earnings are only 91% those of men. Thus a gender disparity still exists, but it is smaller than we observed in Latin America.

Despite this difference in initial conditions, the simulations by Stahlberg et al reinforce our policy conclusions: The relative position of men and women varies, depending on which indicator you choose. Women's own annuities are smaller than those of men, but their lifetime benefit/contribution rates and replacement rates exceed those of men—because they are disproportionate recipients of redistributions through the minimum pension guarantee and unisex tables, which are required in both the public and private pillars. Sweden does not have a joint annuity requirement nor does the public pillar offer a widow's benefit, except on a very temporary basis. Moreover, Sweden's reform moved from a flat benefit for all old people to a minimum pension guarantee that

is price-indexed, therefore will be small relative to wages by the time today's young people retire. As a result, the relative position of women deteriorated in the shift from the old to the new system. Details of policies matter a lot in determining the gender impact.

The old system

The old system in Sweden consisted of a basic (flat) pension received by all residents over the age of 65, a portion tied to earnings (called the ATP) and a special supplement to those with a low or no ATP (predominantly women). The basic benefit was about 40% of the average wage, indexed to prices. The ATP was a defined benefit, with the person's 15 years of highest earnings as the reference wage. The reference wage and therefore benefits had a ceiling but contributions did not have a ceiling. Thirty years of labor force participation were required for a full pension. Retirement age for both genders was 65 but earlier or later retirement was allowed, with actuarial adjustments. A widow's pension that existed prior to 1989 was being phased out and largely eliminated for cohorts born after 1945. The system was financed by a payroll tax, supplemented by general tax revenues.

We would expect the flat pension as well as the special supplement, the ceiling on benefits plus the absence of a ceiling on contributions, to be heavily redistributive toward women. However, basing the benefit on the 15 best years favored men, who are likely to have steeper age-earnings profiles and higher peak wages. Earlier analyses by Stahlberg (1990, 1995) showed that the ratio of expected lifetime benefits/lifetime contributions from the ATP system was 6% lower for women than for men, lowest of all for low-level white-collar and blue-collar women, but it became 35% greater for women once the basic benefit was included in the calculation.

The private pillar in the new system

The new system, as in Latin America, consists of a pay-as-you-go public pillar and a funded privately managed pillar. The funded pillar in Sweden, like Latin America, is a defined contribution plan, with the funds privately managed and investment managers chosen by the worker. Unlike Latin America, the contribution rate is very small—2.5%—and the number of asset managers among whom workers can choose is very large—over 600. Upon retirement, the account balance is turned over to the government, which issues an annuity. The annuity may be fixed or variable, but it is not

indexed for inflation. Unisex mortality tables are used but joint annuities are not required. Contribution transfers between the accounts of spouses are allowed but not compulsory, either while married or upon divorce. Single women are protected by the unisex tables but the standard of living of married women falls when the husband dies since the household income falls by much more than the fall in the cost of maintaining the same standard of living, due to household economies of scale.

The public pillar in the new system

The notional defined contribution plan. The public pillar in Sweden is quite different from and much larger than that in Chile, Argentina or Mexico: 16% of wages is contributed to a notional defined contribution (NDC) plan. Sweden pioneered the NDC plan, which was then copied by Poland and Latvia, as discussed above. Like a funded defined contribution plan, the worker's pension in an NDC plan ultimately depends on contributions plus the rate of return on the account. However, in the case of an NDC, the money does not really accumulate, it is not invested, and does not earn a return that stems from the productivity of capital. Instead, the money paid in by workers today is used to pay benefits to retirees today. But the worker is nevertheless credited with those contributions plus a notional interest rate determined by the government--which in Sweden is the average nominal growth rate of wages (much lower than the rate normally expected on funded accounts). While contributions are only credited up to a ceiling, the contributions continue at an 8% rate on all wages above the ceiling—a provision that should produce a higher rate of return to women who are less likely to reach the ceiling

When the worker retires—anytime after age 61--the notional balance in the account is turned into a real annuity, on actuarial terms, by the government, which then pays the benefit out of contributions that other workers are making at that time. The initial payout is based on expected real wage growth of 1.6% per year as the annuity interest rate. If this rate is realized, the annuity maintains its real value over time; that is, it is price-indexed. But if the actual rate of growth is less than 1.6% real, the individual's annuity payout goes down; that is, it does not keep pace with inflation. The potential absence of full price indexation will hurt women disproportionately, because they live longer.

The notional defined contribution plan replaced the ATP system to eliminate perverse redistributions (such as those to workers with steep age-earnings profiles), incentive and equity problems stemming from the weak link between benefits and contributions, and higher costs for workers as longevity of retirees increased. Benefits from the NDC are directly linked to contributions and expected longevity of each cohort of retirees is taken into account in the annuitization process. However, this also means that low earning women get low pension entitlements.

To remedy this, special provisions were included that redistribute to women. Unisex mortality tables are used in the conversion to an annuity. NDC credits are given for parental leave benefits, periods of unemployment, and for having pre-school children. However, the NDC annuity calculation does not allow for joint pensions, and survivors' benefits are only temporary—paid for only 1 year or until her youngest child reaches age 12 if the widow is under age 65, and nothing if she is over 65.

The minimum pension guarantee (MPG). The public pillar in Sweden contains another component, which is potentially more redistributive—a minimum pension guarantee. If the NDC annuity is small, or if the individual does not have any NDC, sufficient money is paid by the public treasury to bring that person's pension up to the MPG level. In other words, eligibility for the MPG is residence-based rather than contribution-based, which favors women. As we discussed for the case of Chile, an MPG can generate work disincentives for low-earning women, who get no extra pension for incremental contributions. This work-disincentive begins at a lower point in Sweden, because of its universal eligibility—20 years of work are not necessary in order to qualify.

Countering this effect is the fact that Sweden's MPG is price-indexed. Therefore, although it starts out as 40% of the average industrial worker's wage, this percentage will be cut in half by the time today's young worker retires, due to real wage growth in the interim. In that case, very few workers will have own-pensions that fall below the MPG level, so it will be of little help to women. More realistically, the MPG will be increased on an ad hoc basis, as in Chile. If it turns out to be wage-linked, it should be heavily redistributive to women.

Simulations of gender ratios in the new system

Stahlberg et al (2006b) follow our procedure and simulate the impact of new system rules on 4 types of women:

- 1) full career women who have the same labor force participation rates and retirement age as men;
- 2) full time/part time women who work full time until having children, then take parental leave and work part-time until the children are in school, at which point they return to full-time work (this might be the “average” woman in Sweden);
- 3) ten-year women who participate in the labor force for ten years early in life, before birth of children, then withdraw permanently (this is rare in Sweden);
- 4) part-time women who work part-time for most of their careers.

For each case, they construct an earnings profile for 5 levels of education, appropriate to the Swedish situation (no upper secondary school, upper secondary complete, undergraduate education less than or equal to two years, undergraduate education more than two years, postgraduate education). They examine monthly own-annuities, lifetime benefit/contribution rates and replacement rates, comparing these indicators for women with those for full career men. What did they find?

Consistent with our findings for Latin America, women’s monthly own-annuities in the new systems are lower than those of men in all cases (Table 7.3, Panel A). The “average” full-time/part-time woman gets about 80% as much as men, ten-year women get only 35-40% as much, and even full career women get only 83-99% as much as men—because of their lower wages. Notice, however, that the gender gap in own-annuities is much smaller in Sweden than in Latin America—because the wage gap and employment gaps are much smaller and women don’t have an earlier retirement age than men. The differential in lifetime annuities is less than for monthly annuities because of the greater longevity of women (since unisex mortality tables are used). Nevertheless, even for lifetime annuities, gender ratios remain below 100%, except for full career women (Panel B).

However, women get higher lifetime benefit/contribution rates than men--because of redistributions through the MPG and the use of unisex tables (Panel C). As in Argentina, ten-year women fare particularly well. Their lifetime benefit-contribution rates are 3-4 times as great as those of men--because they consistently qualify for the

minimum pension guarantee while contributing for only a short time. One might question whether subsidizing women who have low pensions when old because they chose not to work when young is a socially desirable use of public funds. Also worth noting is the fact that lifetime benefit/contribution rates for women compared with men are highest for women with university education. This is because men with comparable education are likely to hit the ceiling on benefits but must continue to pay contributions.

Panel D shows that women also get higher replacement rates than men, mainly due to the use of unisex tables. When gender-specific tables are used instead, as in Panel E, women once again fall below men, due to their greater longevity, which reduces their annual pension. But for women with university education the female/male ratio in replacement rates remains greater than 1 because of the ceiling on benefits faced by men. The child credit, in contrast, has only a negligible effect (Panel F compared with Panel D).

The current Swedish system does not mandate a joint annuity from the private account, which was largely responsible for bringing the gender ratios of lifetime retirement income for women above that of men in Latin America.⁴² However, this provision would in any event be much less effective in Sweden, where co-habiting rather than marriage or formal registration is very common. It is difficult to mandate future financial transfers to compensate for current services, in the absence of some formalized arrangement. To the degree that women provide the current services (such as child-bearing and caring) their future financial position will be in jeopardy. Many women are responding by cutting back on these services and having fewer children.

Comparisons of gender ratios in new and old systems

Comparing gender ratios in the new and old systems, we find that the relative position of women has deteriorated in virtually every case except for ten-year women (compare Table 7.3 versus 7.4). The main reason is the replacement of the flat basic benefit by the minimum pension guarantee. In the old system, everyone got the basic benefit plus a special supplement for those with little or no ATP, which favored women. In the new system, these have been eliminated and most groups (except ten-year women) will have an own-pension that exceeds the MPG. The high labor force participation of women, equal retirement age for both genders and price-indexation of the MPG explain this result. Gender ratios would be much higher and might exceed old-system ratios if the

MPG were wage-indexed, as it is in Chile on an ad-hoc basis. Lifetime gender ratios for married women and the welfare of very old widows would also be higher if Sweden mandated that joint annuities be purchased for married (or registered) couples, as in Latin America. Many analysts expect that once the MPG has fallen to a less costly level, wage or Swiss indexation (50% wage, 50% price indexation) will resume.

III. Australia

The old system

We make a final comparison with Australia—an example of a high-income country that adopted a multi-pillar system ten years ago. Unlike all the other countries we have studied, the old mandatory system in Australia consisted of a means and asset-tested old age benefit that was based purely on residence rather than employment, financed out of general revenues. Augmenting this simple public system, Australia had a system of voluntary private funded pensions that resulted from collective bargaining and industry-wide pay awards. (Data given below on Australia are from Ginn, Daly and Street 2001, Shaver 2001, Schulz 2000, Kelly, Harding and Percival 2002a and b, unless otherwise mentioned).

The mandatory employer-sponsored private pillar in the new system

In 1992 this network of voluntary plans became mandatory—employers were required to put a minimum specified contribution (starting at 3% but rising to 9%) into each worker's account. This was, in part, an attempt to increase worker remuneration without increasing inflationary pressures. In addition, it was a way to increase national saving and avoid a huge burden on the means-tested pension as the population aged over the coming years. If workers were required to save today, they were less likely to be eligible for the public old age pension in the future. The outcome was that Australia was one of the first countries outside of Latin America to develop a multi-pillar system.

The private pillar, known as the Superannuation Guarantee, consists of funded plans that are arranged by the employer, usually defined contribution and usually with some investment choice. When these pensions were voluntary, men were much more likely to have them, and to have larger pension amounts, than women. Making the private pillar mandatory therefore incorporated in the mandatory system a component that was

less favorable to females, but it greatly increased the access of women to private pensions. In 1984, 51% of male full time workers but only 35% of females were covered by private pensions. By 1994 coverage exceeded 85% for full time workers of both genders. And for women working part-time, coverage increased from 6% to 70%.⁴³

Projected private pension amounts will be much lower for women than for men in Australia, as in Latin America and the transition economies, and for similar reasons. Currently, the female labor force participation rate is 60%, of which 40% is for part-time work, and women are permitted to retire at age 60, earlier than men. (This is gradually being raised to equality with men at 65). Women who enter the labor force today are projected to accumulate 28 years of work, as compared to 39 years for men (i.e. 72% as much as men). Females are concentrated in low-paid occupations and earn only 88% per hour as much as men, on average.⁴⁴

A recent survey provides information on the superannuation accumulations of women compared with men, as of 2002 (HILDA Survey as reported in Clare 2004 and Table 7.5). For older workers these data include savings from time periods when retirement savings were voluntary, but for younger workers the data mainly reflect the period after superannuation became mandatory. On average, women's accounts were only 55% as large as men's accounts, among those who had accounts (and men were 20% more likely to have an account). These gender ratios are somewhat higher than those in Latin America, but still quite low. However, the gender disparities are much smaller once employment status is controlled. Among full time workers, women's accounts were 66% as large as men's, and among high income employed workers, they were 82% as large (probably because women with high incomes are likely to have a history of high labor force participation).

Perhaps most important, gender disparities are much smaller among women under age 44, within each employment category. In fact, for some young sub-groups, women's accounts were larger than men's. We don't know the degree to which this is an age effect or a cohort effect. We know that the education and labor force participation of women has risen in the past 3 decades, when these younger cohorts would have entered adulthood, and furthermore retirement saving became mandatory in 1992—both of which would be expected to raise female/male pension saving ratios. The smallest accounts and

largest gender disparities occur among older individuals who are out of the labor force, unemployed or low-income workers. All of these sub-groups are disproportionately women. Gender ratios of superannuation assets are projected to rise to about 70% by 2020, as women's labor force participation and retirement age increases (Kelly, Harding and Percival 2002a and b). The clear message—the gender ratio in contributory pensions will not change until the labor force role of women changes. This seems to be happening, but very slowly.

The flat means-tested public pillar

How it works. The public pillar in Australia's multi-pillar system is the old residence-based means- and asset-tested benefit. Many OECD countries have such a benefit. Australia offers a good example of how a non-contributory old age benefit might work. The benefit is flat, but gradually phased out for those with incomes above a threshold. The phase-out is slow enough so that 80% of the population over age 65 receives at least part of the benefit. It provides single persons with an income that is 25% of average male earnings, and 40% for couples—close to the poverty line. Retirement age is 65 for men, 60 (gradually being raised to 65) for women. Unlike the public benefit in Latin America and the transition economies, it is indexed to wages, hence will retain its relative value over time. Its cost in 1995 was 3.1% of GDP, which in Australia is roughly equivalent to a 5% payroll tax, but the cost is projected to go much higher as the population ages. In addition, recipients get other benefits such as discounts on medical expenses and taxes.

Despite the family income and asset test, women are more likely to qualify than men in view of their lower own-incomes, earlier retirement and greater longevity. Even if they don't qualify immediately upon retirement, they are likely to do so as they age, use up their own resources, and become widows. Women are also more likely to get the full benefit. In 1998 almost 2/3 of all recipients, including 3/4 of recipients over the age of 85, were women. The majority of female recipients were single or widowed. Many were women who had very limited labor force experience—women who would have been excluded from the public benefits in Latin America or Eastern Europe.

Stylized simulations. Projected pensions for the future using micro data are not available for Australia, but we have carried out stylized simulations with rules similar to

those in Australia, which shows that this type of public pillar substantially reduces the gender gap. All workers in the bottom education group get the full public benefit, workers in the middle education group get partial benefits, widows and single women get some public benefit in all education categories, but single or married men and married women at the top end get no public benefit. Simulated gender ratios, combining public plus private benefits, range from 80% for singles with low education to 60% for married individuals with higher education (the latter based purely on the gender ratio assumed for the private pillar). Thus, Australia's public benefit redistributes, in particular, to low earning women, widows and single women with limited labor force experience. At low educational levels the public pension can exceed the women's own-pension, and is likely to cut the gender gap in half (Table 7.4, especially last 3 rows).

The public benefit in Australia has a similar impact to the flat benefit in Argentina, but with some differences among sub-groups that indicate important differences in concepts of equity. Both redistribute heavily to low earners and to women with limited labor force attachment. However, since Australia's eligibility test is based on residence rather than employment, it benefits women who have stayed out of the labor market for their entire lives, a group that gets no protection in Argentina. It is wage-indexed, hence will continue to provide protection for future cohorts of women, unlike Argentina's benefit which is neither price nor wage-indexed, hence may decline in importance through time.

How costs are controlled. Of course, these features are costly. To help pay the bill, Australia withdraws the benefit from the very groups that get the largest flat benefits in Argentina--high earning men and women with full labor force participation--while taxing them to cover the system's costs. This potentially poses a disincentive to formal sector work—an efficiency cost that must be added to the monetary outlays. However, Australia, unlike Argentina, has the administrative capacity to compel compliance and to contain the size of the informal economy. Australia's strategy probably would not be feasible in Argentina and would lead to greater informality and inefficiency because of evasion by those who are expected to finance the expensive old age pension without receiving any of its benefits.⁴⁵

Australia also saves money by basing eligibility on family rather than individual income and assets. This means that low earning women don't get the full public age pension if they are married to high earning men. It avoids giving public funds to women from high income families who have low personal incomes because they can afford to work at home rather than in the labor market; Chile's MPG, which is based on the individual's own pension income, has been criticized for subsidizing women from high income families. But if the high earning spouse wields power over the allocation of household resources, a family test may mean that some older women end up with little resources for themselves yet no access to public funds.

Other design features that may help women. The Australian system has other design features designed to help women without imposing a large cost on the public treasury, including (1) tax advantages for contributions into accounts of low-income or non-working spouses; (2) the possibility of contribution-splitting between husbands and wives; (3) the option to continue making contributions to one's superannuation account for two years after leaving a job (during interrupted careers to which women are prone); and (4) the requirement that divorce settlements take pension assets into consideration, and dividing the assets is allowed (although not required). However, annuitization is rare and unisex mortality tables are not required.

Perhaps the most important problem for women is that annuities, in particular joint annuities, are not required and, in fact, the money can be taken out as lump sums as early as age 55 (now being raised to 60). This has led to fears that retirees will use up their retirement savings quickly in order to qualify for the public pension, leaving little saving or insurance for the wives when they become widows. Joint annuities would reduce the eligibility of women for the means-tested old age benefit, but neither joint nor individual annuities seem likely to be mandated in the near future. In Australia this burden is borne by the larger public benefit that widows receive, rather than by the joint annuities that are financed by husbands in Latin America.

In sum:

The multi-pillar reform in Australia has helped women in absolute and relative terms by giving them much greater access to private funded pensions than they had before. Retirement age is gradually being equalized between the genders, which will

substantially raise women's own retirement income. The residence-based means- and asset-tested public pillar that reaches 80% of the older population redistributes to low-earning women and eliminates old age poverty. Women are not excluded by eligibility rules based on contributions. Given its broad coverage and wage indexation, the Australian age pension has a much more equalizing impact than the public pillars in other regions. The comparison with Latin America shows that if the public pillar is redistributive, a larger benefit will equalize gender ratios more than a smaller one; while the comparison with the transition economies shows that size alone doesn't accomplish this.

On the downside: the tax cost of the public benefit is higher in Australia than in Latin America, because it reaches most old people whether or not they have worked in the labor market and it rises on par with wages. Both taxes and means-testing pose a possible disincentive to formal sector work and personal saving. These costs could be reduced in the future, while maintaining protection for men and women, if pension withdrawals over the lifetime of both spouses, such as joint annuities, were required.

VIII. Design Features that Determine Gender Outcomes

Multi-pillar social security systems consist of two key parts: a contributory part that is financed by payroll taxes and ties benefits closely to earnings and contributions, usually through privately managed retirement saving accounts, and a redistributive part, which has little or no link to employment history, and is often financed by general revenues. The contributory-saving part is mandated as the least distortionary way of ensuring that workers have pensions that prevent a large fall in standard of living as they age, due to myopia that prevents many individuals from saving enough on a voluntary basis. The redistributive part is needed because of gaps left by the contributory part: it diversifies income sources and reduces risk for all participants; it may keep out of poverty workers at the bottom end of the income scale who don't earn enough when young to save to support themselves when old; and it may help address the needs of women who traditionally worked in the home with the expectation that their husbands would support them financially, then find this expectation unfulfilled due to divorce or widowhood. For low and middle-income countries, the redistributive part of the old age plan may reach many individuals who spent part of the lives in the large informal sector, where contributions can't be effectively enforced. This chapter summarizes the key policy choices discussed earlier that impact women, regarding the retirement saving and redistributive parts of old age systems. We evaluate these choices in terms of three gender-related objectives of old age programs:

1. *Poverty prevention.* Most people will agree that, at a minimum, poverty should be prevented in old age. Indeed, this is the most compelling reason for being concerned about the low benefits that many women receive. Pockets of poverty are particularly prevalent among very old women living alone, such as widows and divorced women without family support.

2. *Broader equality.* Many people believe that broader gender equality is an important goal, even above the poverty line. According to this viewpoint, it is desirable to narrow the gender gap in old age income that develops as a result of factors beyond the woman's control (such as access to lower wages or higher longevity) or even factors that are within the woman's control (such as lower labor force participation rates). However,

this is a value-laden goal, as some believe that voluntary decisions about how much to work are personal decisions that should not be subsidized or penalized by the state, so long as poverty is averted.

3. *Minimizing tax costs and work disincentives.* A third goal involves minimizing the fiscal costs, tax costs and work disincentives of the old age program. We distinguish between fiscal costs, which involve monetary outlays by the government, and tax costs, which could arise from restrictions on payouts from the accounts, thereby making the contributions appear more like a tax. Broader equality is likely to cost more than simple poverty prevention and higher fiscal or tax costs can discourage work, especially formal sector work, thereby leading to lower earnings and pensions for the individual and less output for the economy as a whole.⁴⁶ Detailed benefit rules that provide a stronger safety net for those who work more can partially counteract this disincentive effect. But this is likely to imply weaker protection for those who work less.

Since the poverty-prevention goal may compete for resources with the broader equality goal, and these two goals are likely to imply different fiscal and tax costs and work (dis)incentives, trade-offs are inevitable among these gender-related objectives of old age programs. Each of the three countries we have studied has made different trade-offs. Chile has emphasized objectives #1 and 3 (preventing poverty and minimizing taxes), Mexico #2 and 3 (broader pension equality and work incentives) and Argentina a partial and inconsistent mixture of #1 and 2 (poverty prevention and equality), with apparently little regard for fiscal costs or incentives. These priorities work through key design features they have chosen for their public and private pillars.

I. Policy Choices in the Private Funded Pillar

The accumulation stage

Defined contribution plans have an accumulation stage and a payout stage. The main gender-related issue during the accumulation stage concerns the possibility that women may invest more conservatively than men, therefore get a lower expected rate of return and end up with lower balances and pensions. This gender difference in risk aversion has been found in several studies, although it is reduced when other factors, such

as income, education and marital status are taken into account (US General Accountability Office 1997; Hinz et al 1997; Jianakoplos and Bernasek 1998; Sunden and Surette 1998; Bajtelsmit et al 1999; Bernasek and Shwiff 2001; Lyons and Yilmazer 2004; Save-Soderbergh 2005). Moreover, the differential would be much smaller if measured in risk-adjusted terms (the conservative portfolios that bring lower returns also imply less risk and could come out ahead if markets experience a prolonged downfall). We may surmise that the gap will be reduced still further when women gain more financial experience, as they will in a mandatory plan. Nevertheless, policies can also cut the variance in rates of return—through financial education, simple and limited investment options and careful selection of the default portfolio, into which workers are placed who do not make an active choice of their own. These policies are especially important for women, who have had less financial experience than men.

We did not encounter this issue in our three sample countries, because they offered workers little choice of investment strategy in their early years. In our simulations we therefore assumed the same rate of return for everyone. Over the long run, and even more so in richer countries, workers will face greater choice, so variance will develop in rates of return among workers and possibly between the genders. Then, these policies take on added relevance. However, most of the gender-related policy choices occur at the payout stage, and we turn to these now.

Should retirement age be equalized for both genders?

In traditional defined benefit plans, women are often permitted to retire earlier than men. Since monthly benefits are usually not adjusted in an actuarially fair manner, women can increase their lifetime benefits by retiring early—and practically all of them did so. Perhaps this common practice stems from the fact that wives tend to be younger than their husbands; a lower retirement age allows them both to retire at the same time. But this “special privilege” is anomalous, given that women have worked less, are likely to live longer than men, and have relatively low incomes in very old age. It is a costly privilege, which adds to the financial woes of defined benefit plans. It is also costly for the broader economy, which loses valuable experienced labor.

Even after the reforms, Chile and Argentina still permit women to start withdrawing their retirement saving at 60 rather than 65 and most of the transition

economies also permit earlier retirement for women. However, in contrast to traditional defined benefit plans, the funded defined contribution plans annuitize on an actuarially fair basis. This means that early retirement translates into smaller accumulations and lower monthly benefits for women.⁴⁷ The monthly pension for women in Chile would be raised almost 50% if age of normal withdrawal were pushed to 65, as for men. Also, the projected fiscal cost of the MPG would fall, because average own-annuities would then exceed the minimum for all educational groups. Early retirement for women, combined with delayed access to the public benefit, is a major reason for the exceptionally low gender ratio of monthly own-pensions in Argentina. Mexico's equal retirement age for men and women has saved money and augmented its gender ratio and labor force at the same time.

Women can, of course, postpone retirement voluntarily. One of the advantages of a defined contribution plan is the hope that actuarially fair penalties will induce them to do so. But legal floors on retirement age exist because of the likelihood that some workers are myopic and will not respond to these incentives. The earlier allowable retirement age for women leaves them particularly open to such myopia. The possibility of more leisure financed by faster access to their retirement savings may be a source of greater utility at the moment. But they may regret it later on as they live longer than expected, wages rise but their pensions do not rise and do not afford them their desired standard of living. In very old age, women who retired early may find themselves with monthly incomes far below those of male pensioners and even further below those of contemporary workers. And meanwhile the economy has lost the fruits of their labor. A higher retirement age would add to the supply of older workers and yield a fiscal saving that could be used to pay for wage indexation of the MPG to protect very old women and future generations of women. Retirement age differentials by gender clearly violate all three objectives outlined above and will likely have to be revisited in most countries.

Should annuitization be required?

In a defined contribution plan, workers accumulate savings while working and consume these savings during their retirement period. Workers who are myopic may use up their savings before their actual or expected age of death, if flexible withdrawals are required. Women are especially prone to outlive their savings, because of their greater

longevity. 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. Moreover, expected lifetime has been increasing about 1 year per decade—that is, a person born ten years later will probably live a year longer. This longevity increase is accentuated in middle-income countries that are catching up with medical technologies used in richer countries. Workers may not take this into account in their calculations, basing their expectations on the experience of their parents, who had a much lower expected lifespan.

Annuities, which provide longevity insurance, are therefore important to all workers, but especially to women, who may otherwise be left with meager resources in very old age. Upon retirement the worker turns over his or her accumulation to an insurance company, which agrees to pay him or her a specified monthly benefit for the rest of the individual's lifetime. Policies that limit payout options, with annuitization required or strongly encouraged, protect women from uncertainty as well as from their own myopia and protect society from the fiscal cost of supporting very old women living close to or below the poverty line.

Of course, everything has its cost, and the cost of mandatory annuitization is that some people, who expect to die young or are over-annuitized from other sources (such as company pension plans), will be worse off than they would if they could withdraw their funds more quickly. Money tied up in annuities can't be drawn on to meet emergency needs that might arise shortly after retirement. These costs can be reduced by partial annuitization and by offering choice with regard to type of annuity. Annuities come in many flavors—individual annuities that cover a single retiree, joint annuities that cover a designated beneficiary as well, and annuities with a guaranteed payout period, that continue making payments to the estate for a specified number of years even after the primary beneficiary dies. The latter two types can be used by people who believe they may die relatively young, but wish to protect their heirs.

Traditional defined benefit plans implicitly offered annuities—lifelong benefits. The three Latin American countries we analyzed offer annuitization or gradual withdrawals as two alternative payout options from their defined contribution plans. In our simulations we assumed annuitization. More than half of all retirees have annuitized

over the 25-year history of Chile's pension system, in part because annuities offer a good rate of return for a safe investment, in part because of aggressive marketing by insurance companies, and in part because preferred options (such as lump sum withdrawal of the entire amount) are not permitted. In contrast, lump sum withdrawals are allowed in Australia, to make the accounts less restrictive and more attractive—but probably raising future financial pressures on the public old age pension. And, at the opposite extreme, annuitization is mandated in Sweden to ensure that everyone has a lifelong income without imposing an additional cost on the public treasury. Of course, a person who is in ill health and expects to die soon may resent this mandate, which prevents him from using his savings for medical expenses or a luxurious vacation before death. But the joint or guaranteed period annuity option at least assures him that someone he cares about will eventually benefit.

Mandatory annuitization is consistent with objective #1—poverty avoidance. It reduces future fiscal costs but increases the tax component of the current pension contribution, by constraining workers' eventual use of their retirement savings--thus its impact on objective #3 is ambivalent. An intermediate option consistent with these objectives might mandate annuitization (or deferred annuitization) up to the expected future poverty line (which is somewhat greater than the present poverty line).

Should annuities be price-indexed?

Indexation is crucial for both genders. It is particularly important for women, who live longer than men and would otherwise be left with low purchasing power late in life. With price-indexation the monetary value of the annuity increases each year, just enough to compensate for price increases. This allows the elderly to maintain a stable standard of living. With wage-indexation it increases still further, enough to keep up with wage growth, which is generally higher than price growth, owing to productivity increases. Of course, the higher future payout of the annuity means that the retiree must accept a lower initial payout—this is the trade-off. The question is: which time stream of payouts would workers prefer and which is best for society?

Higher initial payouts through nominal (non-indexed) annuities may be very appealing at first, but this preference may be myopic, as the individual's standard of living will fall in the future. With an inflation rate of, say, 4% per year, the real value of

the annuity will be cut in half over the retirement period of the average male worker, who lives 18 years after retirement, and to one-quarter of its initial value for the very old woman who lives as long as 36 years after retirement. This could easily bring her below the poverty level. Clearly, policy-makers face a trade-off between objectives #1 and 2, versus #3, since any restriction on payouts, such as an indexation requirement, increases the perceived tax by workers. But it also avoids the higher fiscal cost that might be required if many older retirees fell below the poverty line. In general, long-lived retirees benefit from annuities that keep pace with prices, while retirees who expect to die young benefit from nominal annuities. This means that women and high earning men are major beneficiaries of indexation requirements, while low earning men will do better with front-loaded payouts implied by nominal annuities, if they are placed in the same pool.

What do countries do? After retirement, the on-going private annuity is required to be price-indexed in Chile. Mexico intends to require that annuities be price-indexed after retirement, but it is not clear that insurance companies will be able to offer that product at a reasonable price. Inflation protection is an expensive product for insurance companies to provide because of the reinvestment risk and non-hedgeable inflation risk they incur. In general, they can't issue such insurance credibly, unless they can invest in indexed financial instruments. Moreover, companies pass the cost along to annuitants in the form of a lower implicit rate of return.

Chile is one of very few countries where indexed instruments of many sorts exist and insurance companies therefore offer a high return on indexed annuities (James, Martinez and Iglesias 2006). Indeed, an inflation-indexed unit of account is used for most long-term transactions in Chile (a remnant of its history of hyper-inflation) but not in most other countries, making indexed annuities costly and probably not credible in the latter cases. Indexed annuities are available in the UK, but a high load factor is charged, partially for these reasons.⁴⁸

One possibility is for the government to require price-indexation with a cap, such as the 5% cap in the UK, which is more manageable for insurance companies. Another possibility is for the government to reduce reinvestment and inflation risk by issuing indexed government bonds of varying durations, including very long-term bonds. Indeed, if the government requires or encourages the use of indexed annuities, this is an essential

first step. In Sweden, the government has gone beyond this and has taken over the responsibility for providing the annuities in exchange for the funds in the accounts. In our simulations, we assumed that the annuity maintains a constant real value over the retiree's lifetime, which means we assumed actuarially fair price-indexed annuities or the absence of inflation.

Should joint pensions be required?

Since women are likely to outlive their husbands, survivors' benefits are crucial to their financial welfare. Because of household economies of scale, it costs one person about 70% as much to live as two people, so the widow's standard of living is bound to fall when she loses her husband's pension, unless she receives survivors' insurance. The old systems in our three sample countries offered survivor benefits that were financed by the common pool. These benefits ranged in size from 50-90% of the husband's pension. This meant that marital status had a big impact on total value of the transfer received by an individual or a family. Married women who didn't work in the labor market got more than single women who didn't work and even more than many single women who did work; the subsidy was financed by contributors at large.

In order to economize on these outlays, many countries (including Chile) required women to give up their own pension to get the widow's benefit (or vice-versa), so married women who worked got little or no increment for their contributions. Two-career families, both of whose members contribute, subsidized one-career families, who got the same benefit for only one contributing member. This kind of arrangement for survivors may induce wives to stay at home or to work in the informal sector where they avoid this tax. The US has a similar provision in its social security system. Spouses receive 50% of their husband's benefit while he is alive and 100% after he dies, but must give up their own benefit to get this. A recent study found that this provision led wives to work less and retire early (Munnell and Jivan 2005, Munnell and Soto 2005).

In contrast, the new systems of all three Latin American countries pass the responsibility for survivors' insurance on to husbands. They require the husband to spread his retirement savings over the expected lifetimes of both spouses through joint withdrawals or joint annuities. Most male retirees purchase joint annuities.⁴⁹ This formalization of the informal family contract produces a large intra-household transfer to

wives. We saw earlier that this mandatory transfer is responsible for a large improvement in the lifetime retirement income of married women. This improvement is overstated in families where husbands would have purchased life insurance voluntarily, since such voluntary arrangements may be crowded out by the mandatory arrangements. 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 an equivalent amount voluntarily (see Bernheim et al 2002). Evidence from the UK, where a large voluntary defined contribution system has existed for some time, suggests that the vast majority of men purchase single life rather than joint annuities (UK Pensions Commission 2005). Apparently most widows can count on protection from their husband's retirement saving only if joint pensions are mandatory.

Most important, widows are allowed to keep this 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 have to pay twice, by foregoing her own pension. This ends the subsidy of one-earner families by two-earner families, and the high taxation of married women who work in the market. It enhances the incentive for women to work in the formal sector and it helps to maintain the widow's standard of living at levels attained while her husband was still alive. It is likely to reduce poverty among very old women, since the money flows in just at the point where household income would otherwise be sharply cut. The widow's benefit plus own benefit maintains household purchasing power at about 70% of the previous level, so her standard of living is roughly unchanged. It is the main provision that raises the present value of total lifetime benefits of married women relative to married men beyond that attained in the old systems. And it does so without placing a burden on the public treasury or on single men and women.

Also, the joint annuity effectively extends a contributory employment-based system to cover very old women who did not work in the formal market, so long as their husbands did—with private intra-household transfers instead of public transfers. It is therefore a partial alternative to a non-contributory scheme, with much lower tax costs. It is consistent with objectives #1, 2 and 3.

Yet, the joint annuity is not always required—for example, not in Sweden or Australia. The ethos in these countries seems to be that each individual is responsible only for himself or herself. And people who fall below the minimum threshold are picked up by the public benefit. Joint pensions are considered “derived rights” which demean women. This point of view ignores certain objective facts—that women earn less, have lower pensions and live longer. They earn less in part because of bargains they made with their partners to provide household and child-care services. The husband or partner may compensate her by providing money to the household while he is alive, but this flow stops when he dies, so the woman’s standard of living is bound to fall unless legal arrangements require the flow to continue. The joint pension requirement enforces the fulfillment of the inter-temporal trade the couple made in the past that resulted in lower retirement income for the wife. It also avoids a moral hazard problem--the husband may under-insure because he passes his responsibility on to the public treasury. At the same time, the woman keeps her own pension as well as her incentive to work, which is the only way she can become more financially self-reliant and avoid dependence on “derived rights.”

What should be done in case of divorce?

Of course, women may also lose their partners through divorce. Traditional defined benefit plans often make special provisions for divorced women. For example, in the US they get the same benefits as a wife would, providing they were married for at least ten years and do not remarry. In this way, a man who sequentially marries four women for ten years each gets social security to support four wives.

The treatment of benefit and asset rights in divorce situations was not on the agenda in our three sample countries, when they reformed. It is uncommon in Argentina and Mexico and was illegal in Chile until 2004. Thus regulations did not restrict what participants could or could not do with their accounts in case of divorce and we did not deal with this issue in our case studies. However, divorce will probably be increasing there, just as it has increased around the world. In Mexico the divorce rate already doubled between 1970 and 2000. In the U.S. the divorce rate for the baby boom generation born 1946-64 is double that of its parents, who were born 1926-30. And older women who are divorced have very high poverty rates (Munnell 2004). According to

projections for the UK for 2021, 38% of women aged 55-64, just before retirement, will not be part of a marriage; about one-third of this group is never-married and two-thirds are divorced (UK Pensions Commission 2005).

The same logic that applies to joint pensions applies when marriages are split by divorce. Given the inter-temporal exchange of services for financial support in a marriage, it seems reasonable that the money accumulated in retirement savings accounts should be considered community property, to be split upon divorce. Each party could then use his or her share to purchase an annuity or other pension, upon retirement. Similar procedures could be followed upon the break-up of registered partners, which is a quite common arrangement in Europe. However most countries that adopted multi-pillar systems have not yet dealt with this issue.

Informal co-habitation is increasingly replacing formalized arrangements such as marriage or registered partners, both in Europe and the U.S. Where the relationship is informal, it is more difficult to enforce future compensation for past services provided by the woman, such as child-bearing or child-raising, which may have diminished her long-term earning and pension prospects. She bears the risk of low income in old age if the relationship should break up.

Unisex tables

Even with laws requiring joint pensions for spouses, asset-splitting upon divorce and a redistributive public benefit, the problem of low monthly pension income remains for women, especially very old single women. This is due to remaining differences in labor force participation and wages and to the greater longevity of women. Are additional policies needed to eliminate the remaining gender gap and if so what form should they take? The required use of unisex mortality tables in the purchase of annuities has sometimes been urged, to reduce this gap.

Unisex tables assume a common (average) survival probability for both genders, in contrast with the usual practice by insurance companies of using separate gender-specific mortality tables for men and women. When gender-specific tables are used for individual annuities, men and women who start out with equal accumulations get equal expected lifetime payouts but women get lower monthly payouts because they are expected to live longer. Unisex tables equalize monthly benefits for men and women with

identical retirement accumulations, raising annuities for the latter and lowering the former by 5-10%. It is thus consistent with objective #2—broader gender equality. (As we have seen, these precise numbers are quite different and much smaller in the context of joint annuities). Women get a larger expected lifetime benefit than men who have contributed the same amount.

This effect is accentuated if the pension is indexed, shifting payouts to later in life. Under a unisex regime, women as a group gain more with indexation than they did with nominal annuities, while men pay a higher price for inflation insurance since they pay up-front for higher benefits later on, which they don't survive to get.

Which is the more appropriate gender equity indicator—disparities in monthly or lifetime benefits? Each of these measures a different dimension. Monthly benefits determine the standard of living of retirees, but lifetime benefits inform us of which group has gotten more than its total contributions and is therefore the recipient of cross-subsidies from the other group. Some would argue that the life expectancy distributions of men and women overlap so much that it is unfair to attribute a higher average lifetime to all women, thereby penalizing them because of an average characteristic of their gender, rather than their own individual probability. However, the same could be said of other criteria used by insurance companies for risk classification—age, health status, and the like. Moreover, the mortality probability of individual women is unknown, although as the annuity business grows we would expect companies to approximate this by developing several cross-cutting criteria for risk classification.

Traditional public defined benefit plans implicitly use unisex mortality tables, paying the same monthly benefit to men and women regardless of their differential mortality. This practice is also followed in the public pillars in multi-pillar systems. Some countries (e.g. Switzerland, Sweden) require that community mortality tables, such as unisex, be used when accounts in the private pillar are annuitized and this is likely to prevail in most EU countries. Transitional economies use unisex tables in their defined benefit and notional defined contribution plans but still have not decided which way to go in their funded defined contribution plans. It is likely that pressures from EU will push them toward unisex.⁵⁰ Most Latin American countries allow the use of gender-specific tables by insurance companies issuing annuities, although Argentina and Chile are

considering unisex. However, as we have seen, the prevalence of joint annuities means that this will make little difference in payouts to married individuals. In this sense, the unisex issue is much ado about little, if joint annuities are required.

In competitive insurance markets, which are typically used in multi-pillar systems, unisex tables pose problems of selection and creaming. Men may avoid purchasing single life annuities, because it will offer poor terms to them. In contrast, insurance companies will seek out men, who are lower risk and therefore more profitable, and try to avoid female annuitants who will live longer. While they may not be legally permitted to exclude women, they may concentrate their marketing or offer better rates in occupations and industries where men dominate. If married men must purchase joint annuities while women must purchase individual annuities, as in Chile, they may charge more for the latter type of annuity, thereby obviating the point of the unisex requirement. In countries where women can retire earlier than men, higher rates might be charged for early retirees, who are predominantly women; this was a concern in Poland as it deliberated its new annuities law.

If nation-wide unisex tables are required, companies that end up with a concentration of female annuitants will lose money; while if companies are allowed to build unisex tables based on their own experience, those with a disproportionate number of females will offer worse payout terms than others, effectively reintroducing gender-specific pricing. But potential future consumers will then seek out better rates elsewhere—the high rate companies with many females may then be in a difficult financial state. If differentiated pricing does not re-emerge, men may simply refrain from purchasing annuities as terms become less favorable to them—adverse selection, induced by legal rules that preclude risk classification. In that case, men forego longevity insurance and the market may end up dominated by the risky group—females—and their higher longevity rates. Thus, unisex tables may not be compatible with voluntary annuitization and competitive insurance markets.

What is the appropriate policy response to these pitfalls of unisex tables?

1. For women who are living at the edge of poverty, most likely single women and widows, it would seem crucial to raise their monthly and lifetime benefits via redistribution—giving these women more in benefits than they contributed to achieve

objective #1. However, unisex tables are an inefficient way to achieve the goal of poverty prevention, since most women who benefit are not poor while some men who implicitly pay by getting lower pensions are poor. An alternative is to use a more transparent and targeted form of redistribution, financed by taxes on high earning men and women, which would be the case if general revenues were used to finance a public benefit with this objective.

2. For women who are already well above the poverty line, unisex tables do help to equalize gender ratios and thereby achieve objective #2. However, requiring joint annuities may be a less distorting alternative to unisex, increasing lifetime retirement income just at the point when it is most needed, for married women.

3. Unisex tables reduce the opportunity cost of joint annuities, and make it more likely that pensioners will choose joint annuities voluntarily. This is a side-benefit of requiring unisex tables. As a corollary, joint annuities virtually eliminate the gain to married women from using unisex tables. Since the mortality of both husband and wife enter into the determination of the size of payout in a joint annuity, it yields a very similar payout whether unisex or gender-specific tables are used. Joint annuities therefore have the side-effect that they defuse the otherwise contentious issue of whether to use unisex tables.

4. If unisex tables are required and individual annuities are allowed, countries should consider using a risk-adjustment mechanism to compensate insurance companies that end up with a disproportionate number of women. 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.⁵¹ 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 creaming, selection and instability 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, countries might consider using a competitive bidding process that concentrates the entire annuity business in one company for a specified

period, to avoid the selection issues spelled out above. Poland has been considering these strategies.

II. Policy Choices in the Public Pillar

We move on now to discuss key policy choices regarding the public benefit. Fundamental decisions here are: should the public benefit be based on contributory history or one that is universal, based simply on age and residence; if based on contributions, how many years of work should be required for eligibility; how targeted should the public benefit be toward low earners or other groups (given that the private benefit is not targeted at all); and, should the benefit be price or wage-indexed, which determines its future size relative to wages? The less employment-related are the eligibility conditions, the more targeted the benefit toward low earners, and the more generous the indexation rule (e.g. wage rather than price indexation), the more women gain, the less likely they are to fall into poverty in old age and the higher are the gender ratios. However, these practices also lead to higher fiscal costs, requiring taxes that may discourage work and output.

Eligibility requirements for the public benefit in contributory schemes

In multi-pillar systems, all workers are eligible to receive the funds accumulated in their personal accounts, regardless of how many years they worked. But eligibility conditions for and therefore access to the public benefit varies widely, from universal to very restrictive. If access to benefits is based on contributory years, details of eligibility rules are crucial. If set “too high” many women will fail to qualify and may end up below the poverty line, but if set “too low” the fiscal cost may be great. What is too high or too low is very country-specific, depending on typical male and female work patterns.

In Chile, where 20 years of contributions are required for eligibility for the minimum pension guarantee, the average woman affiliate qualifies, and women with low education are the main beneficiaries. However, women who worked less than average or in the informal sector will fall below the cut-off point for eligibility, getting a small private benefit and no public benefit—and this turns out to be a sizeable group, given the low density of contributions. In contrast, even the average woman fails to meet the 24-

year eligibility rule for Mexico's MPG. (Ironically, most male workers who meet this criterion will, as a result of their own contributions, have a pension that exceeds this floor). And if 30 years are required, as for Argentina's full flat benefit, only women in the top educational categories, who work the most, will qualify. Argentina tries to resolve this issue by making women eligible for a reduced flat benefit if they have contributed for only 10 years. But this is problematic because it costs a lot and provides a large lifetime subsidy to women who have worked little, including those from high-income families, while at the same time offering no protection to women who have worked less than ten years.

One practical problem with these eligibility requirements is that it is difficult to define what is meant by "a year of contributions." Does it mean every day or one day per year? Workers with a good knowledge of the rules could game the system while those without this savvy could lose out.

A more generic problem with "on-off" switches for eligibility is that a small difference in work histories can make a big difference in access to public transfers. Women who fall just beneath the bar may be totally excluded while those who have just passed the bar may be discouraged from further formal work, especially if the public subsidy gets her up to a minimum and would simply be crowded out by further accumulations of her own.

An alternative approach would make the public transfer a continuous function of contributory days, as in Mexico's SQ, which pays a uniform amount into the account of each worker for each day worked. Eligibility starts at day 1, but the amount of the benefits builds up for every additional day. An MPG could also be set with a low floor and discrete increments tied to number of years, to reduce the cliff effects, strategic manipulation and work disincentives that we discussed in the case of Chile.

Making the public benefit proportional to days worked would redistribute to workers who work a lot, but at low wage rates. In that sense, it would subsidize most heavily those with limited potential earnings, rather than those who chose to work fewer years. However, it would not achieve objective #1, the elimination of poverty among vulnerable groups such as informal sector workers or those engaged in home production. As we saw in the case of the redistribution pattern in Mexico, it also limits the

achievement of broader gender equality (objective #2), because men work more than women.

Attempts to increase eligibility in a system that is mainly contribution-based

In fact, many multi-pillar countries that started with contribution-based eligibility rules have developed alternative paths to avoid poverty among non-contributors or low contributors, impelled by the large numbers who are excluded by these rules. We thus end up with mixed systems that are partly contributory and partly universal.

For example: in addition to its low requirement for its reduced flat benefit, Argentina recently added the possibility of meeting this requirement by claiming self-employment years ex post upon retirement. Anyone can now become eligible simply by making this declaration and accepting a 20% reduction in benefits in lieu of past contributions. Women are likely to be major beneficiaries of this arrangement. This avoids poverty and improves equality in old age—thus achieving objectives #1 and 2—but it violates objective #3—it is not clear how the higher fiscal costs will be covered.

Most European countries with contributory systems grant credits toward eligibility for time spent in child-care and elder care, which adds greatly to the years counted for women. This provision makes sense, in particular, if 1) bearing and raising children and caring for the elderly generate social benefits that exceed the private benefits, 2) society wishes to increase the time allocated to this activity, and 3) pension credits are an efficient way to achieve this result. With fertility rates below replacement levels one might argue that the answers to the first two conditions are “yes” in many countries—but it is worth noting that pension credits have not arrested this decline so the third condition may not be satisfied. An alternative is to allow women to improve their eligibility for the public benefit by making voluntary contributions while engaged in non-market work; however, it is likely that few would use this option, which is the reason for mandating contributions in the first place. Several transition economies, faced with extreme fiscal pressures, have reduced child-care credits to economize on costs as they introduced their multi-pillar reforms, thereby trading off some of objectives #1 and 2 in favor of objective #3.

Should eligibility be universal and residence-based instead of contribution-based?

The entire issue of eligibility and ways to expand it marginally could be side-stepped if access to the public benefit became totally residence-based rather than contribution-based. To assess this choice, it is useful to recall the rationale for basing benefits on employment and contributions in the first place. Pensions were designed to replace wages, therefore it seems logical to restrict eligibility to people who worked for much of their adult lives. Additionally, the pensions are often financed by payroll taxes, so it seems logical to restrict benefits to those who pay this tax. Moreover, it is hoped that people will be less likely to evade the tax if they perceive it as directly linked to benefits. Contributions to a pension scheme may get greater support by the electorate than would a general revenue tax that is not ear-marked, they may therefore be incremental to a politically acceptable general budget, so pensions may not compete with other public services as much as they would if general revenue finance were used. Finally, if access to the public benefit is given only to contributors, it may encourage contributions to the private accounts, thereby increasing retirement income, which is the over-all objective of the program.

However, if access is contribution-based many workers will fail to qualify for a meaningful benefit. Typically, these include the poorest workers—workers in the informal sector and women. This exclusion is particularly acute in low-income countries, where less than half of the labor force is in the contributory system. Most rural women are likely to be excluded. While extended families often care for their older members (as we saw in Chapter 1), this system does not always work well. Some older men and, more often, women, will end up without access to resources from family or social security system. Even in high-income countries, we have seen that women tend to have lower participation rates than men, earn less and therefore get a lower pension than men, a difference which may leave them in poverty if they become divorced or widowed. To avoid these situations, some countries have chosen to base the public benefit in a multi-pillar system simply on age and residence rather than contributory history (while retaining the contributory basis for the private benefit).

In residence-based plans costs are usually borne by general revenues, and the general population is eligible to receive the benefits once they pass the specified age. The benefit itself may be a universal flat benefit or means-tested. A residence-based program

is most likely to achieve the objective of preventing old age poverty, but it will cost the public treasury more than a contribution-based program, thereby involving a trade-off with objective #3.

The Netherlands, Denmark, Sweden, Kosovo and Australia are examples of multi-pillar countries whose public benefits include a component based only on age and residence. Using Australia's plan as an example: its residence-based flat pension is means- and asset-tested, yet it is received in whole or part by 80% of old people; only the top quintile is excluded. One obvious consequence of making the public pension residence-based is that many more women are eligible than would be the case otherwise. A second consequence is that women who specialize in home-work receive positive redistributions while high-earning men and women who specialize in market work pay higher taxes to finance these transfers. Third, women might have less incentive to enter the formal labor force than they would otherwise, due to the income effect from getting the public benefit as well as its phase-out if their own pension grows. Fourth, such a program costs more, hence taxes needed to finance it are higher, than they would be if non-employed individuals were excluded. Australia spends over 3% of its GDP on the age pension and this proportion would be projected to rise much higher in the future if Australia did not mandate retirement saving accounts. Australia contains its costs by phasing out benefits for households in the third and fourth quintiles and cutting off access completely for the top quintile, an excluded proportion that should rise as the recently mandated personal retirement accounts grow.

Targeting the public benefit: how much should it redistribute to low earners?

Although most social security systems claim to redistribute to low earners, this is not universally the case. For example, many defined benefit plans paradoxically redistribute to high earners, who are likely to live longer and hence receive benefits for more years and have steep age-earners profiles that are rewarded by the defined benefit formulae. However, most of the public pillars in Latin American multi-pillar systems redistribute to low earners, although with different degrees of targeting. Indeed, one of the reasons for separating the redistributive and saving functions into two different system components is to make it easier to track whether the subsidies are going in the right direction.

Women as a group gain from public benefits that are targeted toward low earners, because women tend to work less and earn less than men. But, as we saw in our sample countries, women are a heterogeneous group. In fact, the wage and private pension differential between women with high and low education is far greater than the differential between men and women with the same education. Policy-makers may have to choose which is a higher priority: targeting the public benefit to protect low earners, (which will be disproportionately female but will include some men) versus targeting it to equalize pensions between the genders (which will include middle class women as beneficiaries).

In general, minimum pension guarantees and means-tested benefits, as found in Chile, are narrowly targeted. If well implemented, they are a cost-effective way of achieving objective #1, poverty prevention. But they don't achieve broader equality and diversification, they may not be well implemented and they often contain disincentives to work and save. A flat (uniform) benefit, in contrast, is likely to be more easily administered, broadly equalizing and less distortionary, but also more costly. Variations on this theme are found in Argentina and Mexico.

Minimum pension guarantees. Practically every country with a multi-pillar system sets a minimum pension and in most Latin American and Eastern European countries this is implemented by a minimum pension guarantee. If the person's own-pension falls below a specified amount, usually 17-30% of the average wage, the government provides additional resources to top it up. Since the pension itself must be calculated in any event, the marginal cost of calculating qualification for the MPG is small, making this benefit relatively easy to administer.⁵² Generally this kind of public benefit is for contributors only (although in Sweden it also covers non-contributors). The basic idea is: the worker does his or her share and if the proceeds are not sufficient the government does its share to top up the pension. The MPG is supposed to encourage workers to contribute and to allay workers' fears about financial market volatility by setting a floor on retirement income from funded accounts. We have no empirical evidence on whether workers respond to these incentives.

The degree of protection provided by the MPG as well as its fiscal cost depend on the contributory years required for eligibility and the nature of indexation. In most cases

the cost will be modest, because it only applies to workers who have contributed fairly regularly and the bulk of their pensions come from their own accounts. This means the tax supporting it will also be modest and relatively non-distortionary. Nevertheless, low earners may be discouraged from working in the formal sector and contributing once they meet the eligibility conditions, because additional contributions will simply crowd out the public benefit.

As we saw in the case of Chile, women are the major recipients of the MPG top-up, both because of their transient labor and low wages—providing they meet the eligibility conditions. Women also benefit from the focus on individual rather than family income. Some of the women who receive Chile's minimum pension are from middle and high-income households, not in danger of living below the poverty line but with small own-pensions because of transient labor force attachment (Valdes 2002⁵³). These women would be ruled out by a means-tested program that took family income into account, as in Australia. At the same time, poor women who fail to meet the eligibility conditions get nothing from Chile's MPG.

Means-tested benefits. In principle, the least costly way to prevent poverty among the elderly is to apply a universal means and asset test so the benefit goes only to those with meager resources of their own and it goes to all in the population who meet this criterion. A means-tested program is like an MPG, except that all income and assets of all members of household are usually included in the means-test. Also in contrast, this type of benefit is almost always residence-based, not contribution-based, since it aims to aid those who need it most, who are generally outside the contributory system. As a corollary, it is financed by general revenues rather than a payroll tax. Australia and Hong Kong have such programs—very inclusive and paid to the majority of old people in Australia, more narrowly targeted and less expensive in Hong Kong.

Chile also has a small means-tested scheme (PASIS) for non-contributors. The PASIS benefit is only half that of the MPG and, until 2006, was severely rationed (rationing was removed and funding increased in 2006). Only the lowest income groups will get either benefit and women are the major recipients of both. Also in 2006 Mexico launched a massive new initiative that will pay one million elderly in the poorest

communities a residence-based pension worth around 15% of the average per capita income. This means-tested benefit is expected to spread to other communities as well.

The disadvantages of means-testing are well-known: It is more difficult to implement than an MPG, where only pension income counts. It requires much greater administrative resources than flat benefits, where only age and residence counts. If not well-done many people may be mis-categorized. Because case-by-case appraisals must be made, opportunities for bribery abound, particularly in low-income countries where a culture of corruption prevails.⁵⁴ Some people who qualify may not even realize that and may not apply—the well-known stigma and take-up problems. If a means-tested program is started, it should be carefully designed to minimize these problems. A broad-based means-tested program, where a majority of older people qualify and only a small number are excluded (as in Australia) may have an advantage in this regard.

In an extended family setting, women may not have control over all the household income that is attributed to them, so their “means” may be overestimated. And the benefit they derive from the pension may also be overestimated, if it is shared with other family members.⁵⁵ Furthermore, means-testing may crowd out family support and reduce incentives to contribute and save voluntarily, in order to improve eligibility for public aid. In contrast, the MPG is less distortionary, since saving outside the pension system and family transfers do not interfere with eligibility. The flat benefit is even less distortionary since everyone gets the same benefit regardless of other resources.

Despite these disadvantages, means-tested programs have one big advantage over the MPG—they can be used in a universal residence-based system. And they have one big advantage over flat benefits—the limited money can be more clearly targeted toward those in need. For any given budget constraint, old people with low income and assets receive a larger benefit level or for a given benefit level the cost is much lower than under a flat; it is therefore a cost-effective way to alleviate old age poverty—providing it is well implemented. For the same reasons, women are likely to get a larger share of the total budget in a means-tested program than a flat benefit. But means-testing does nothing to improve gender ratios for women who are already above the cut-off point for the test.⁵⁶

Flat benefits. A flat benefit pays a uniform amount (or uniform per day worked) to all eligible people once they reach a specified retirement age. Eligibility can be based

on contributory years or simply on age and residence. Residence-based flat benefits are found in the multi-pillar programs of Denmark, the Netherlands, Kosovo and Bolivia. Argentina's two-tier flat benefit is a variation on this theme in a contribution-based scheme. Mexico's social quota, which puts a uniform amount into the account of each worker per day worked, attempts to combine the flat concept with work incentives. Switzerland's public benefit rises with earnings but only slightly, so it has many of the same effects as a flat benefit.

The size of the flat benefit is unrelated to earnings or own-pension. Thus it may seem to be non-targeted, but the net amount is targeted to low earners if it is financed by taxes paid by high earners. Its tax cost is much higher than that of an MPG or means-tested benefit pitched at the same level, since every eligible person gets the full flat, not simply a top-up for the few. This tax may discourage incremental formal sector work, as a secondary effect. It therefore achieves, objectives #1 and 2, but at a higher cost in terms of objective #3, than the other types of public benefits. While costs may be quite small initially for low-income countries, because they have few old people, these costs will grow over time, as their populations age. These costs and their growth could be contained by measures such as: keeping the benefit modest and "clawing" part of it through the income tax system for very high earners; starting the benefit at a very old age, such as 70 or 75, when retirees are more likely to have exhausted their other resources; and indexing the age of eligibility to life expectancy or pre-scheduling an age increase each year in line with expected longevity gains.

Flat benefits are the simplest to administer, especially if they are universal. All individuals over the retirement age get the same benefit. As we saw in the case of Argentina, they can be set at a level that keeps all eligible old people out of poverty and improves pension equality more broadly by adding a constant public benefit to a varying private benefit for everyone. This constant benefit, of course, is higher relative to wage and own-pension for low earners. Because women are relatively low earners, they get a larger percentage augmentation than men, helping to equalize gender ratios. Moreover, if the benefit is financed by a tax on high earners, women are disproportionate recipients of net redistributions. If eligibility is residence-based or has low contributory requirements, women who haven't worked in the market are the biggest net beneficiaries, as in

Argentina But the share of total spending that goes to low earning women is less than in the case of the MPG, since high earning men also get the flat benefit.

Which is the best approach? In view of all these considerations, which type of public pillar will be most effective in preventing old age poverty among women and raising gender ratios in a multi-pillar scheme? Three options appear to be feasible ways to accomplish this:

1. a two-part scheme consisting of means-tested benefits for non-contributors plus the minimum pension guarantee for contributors (the Chilean model). This combines the administrative simplicity and absence of disincentives for work and saving of the MPG with the expanded coverage possible in a means-tested scheme. Women are likely to be net beneficiaries from both parts. The universal program keeps non-contributing women out of poverty while the higher safety net for contributors encourages women to participate in the formal sector. Making the MPG proportional to years of contributions avoids the arbitrary nature of on-off switches and builds in a continuous reward for work. This is the least-cost way to avoid poverty, both among contributors and non-contributors.

2. a modest flat benefit for everyone. This is a more expensive option. It avoids the problems inherent in means-testing, diversifies income sources more than the MPG and improves gender equality above the poverty line more than either.

- 3) a smaller universal flat benefit for everyone plus an MPG for contributors that starts with this as a base and increases with years of contributions. This avoids the problems of both other approaches—the transactions costs of means-testing and the benefit costs of a higher universal flat—while also achieving objectives # 1 and 2 to some extent.

The choice among these alternatives depends in part on the country's fiscal capacity as compared with its administrative capacity. It also depends on the degree of heterogeneity and poverty among the old versus the young. If old age poverty is pervasive, the case is strong for using the flat benefit. But if poor old people are less common than poor young people, and there are wide income disparities among the elderly population, it may be preferable to use the MPG + means-testing, which is cheaper and more selective. We saw in Chapter 1 that countries vary in this regard.

As the proportion of old people has risen due to population aging the cost of the flat benefit has increased. Some rich countries are now downsizing the relative size of their generous flat benefits by using price rather than wage indexation and Sweden has completely eliminated it in favor of a minimum pension that covers both contributors and non-contributors. This will keep older women out of poverty but may decrease gender equality above the poverty line, as a trade-off for lower costs.

Should the public benefit be price-indexed or wage-indexed?

The Argentine flat benefit has remained constant in nominal value over time. As prices rose, this situation became so untenable that Argentina had to add a minimum pension that exceeded the flat benefit, on an ad hoc basis. An automatic adjustment rule would allow better planning by workers and retirees. Mexico plans to price-index the public benefit—that is, maintain its real purchasing power—but we don't yet know how that will work since no one has yet retired under the new system. Chile's minimum pension guarantee is supposedly price-indexed, but actually it has risen on par with wages, both for new and old retirees, over the past twenty-five years. Chile also grants additional increases at ages 70 and 75, so effectively the MPG grows faster than wages or prices, over the retirement period of the individual. This is especially valuable to women.

Price indexation of the on-going public benefit is essential in order to set a real floor to retirees' standard of living and prevent real declines over their lifetimes. But price indexation poses problems as a method for determining the magnitude of the initial public benefit that will apply to successive cohorts, because it implies that the safety net will fall over time relative to wages. For example, a price-indexed flat benefit in Argentina or MPG in Chile that is 27% of the average male wage today will be only 12% when today's young worker becomes a pensioner at age 60, under our baseline assumption of 2% annual real wage growth. Although the safety net appears reasonably high today, it will be low compared with wages and the average standard of living in society at that time. It will also be low compared with the size of the annuity from the private accounts, so it will do little to counteract gender or other differentials in the future. That is part of the reason why very few future retirees require Chile's MPG top-up in our simulations with price indexation. Our simulations showed that the protection

afforded by the MPG is much greater and more widespread under wage-indexation. But the cost will also be much greater.

Australia also wage-indexes its safety net. This enables retirees to share in the economic growth that occurs over time and it affords the same level of relative protection to present and future cohorts. It particularly benefits women. But it is much more expensive than price-indexation. Australia will be able to continue this policy, in part, because it established a multi-pillar system with a large mandatory defined contribution plan, which will reduce the number of retirees qualifying for the public benefit under its means-test.

The U.K is an opposite case in point. Its basic (flat) benefit has been price-indexed for over fifteen years, both for benefits already in payment and for new cohorts. Its value has fallen from over 20% to less than 15% of the average wage. Since this provides an unacceptably low standard of living compared with current workers, it has had to be substantially supplemented by means-tested benefits. Very old women have relatively high poverty rates and are disproportionate recipients of these means-tested benefits. The U.K is the one OECD country that projects low fiscal costs despite the growth in its older population, because of its policy of price-indexation. Yet, it is considering major changes in its system, in part because of widespread dissatisfaction with the low relative level of its safety net.

Switzerland tries to stay on the fence between these two approaches by indexing its public benefit half to price growth and half to nominal wage growth. Several transition economies follow this example. Sweden is currently using price-indexation to draw down its minimum pension to more reasonable levels, after which many analysts expect it to resume wage or Swiss indexation.

If the objective of the public benefit is poverty-prevention, and if the poverty line is defined in absolute terms as the cost of purchasing a fixed market basket of goods, price-indexation satisfies this criterion. But if poverty is defined as a socially determined concept and if broader equality between pensioners and workers matters, wage-indexation of the initial public benefit for successive cohorts is the appropriate technique, once a reasonable wage-benefit ratio has been established. Otherwise, future generations of low earning pensioners will fall further below the average standard of living in society

The outcome of this debate is of particular concern to women, who are most likely to be recipients of the public benefit, and for the longest retirement period.

Which women should be subsidized (besides low wage-rate earners)?

Social security systems redistribute among many groups. We have emphasized the poverty-prevention goal of public pillars in multi-pillar systems, which redistribute to low earning women. But some systems redistribute to married women, or to women who work in the home rather than the market, or to other subsets. Women are a heterogeneous group. Which sub-groups should society subsidize—bearing in mind that a subsidy to one group means that some other group must be taxed, and taxes and subsidies influence behavior? Traditional systems often subsidize women who have chosen to work in the home rather than the market, or because they are married. We examine the basis for these subsidies in this section.

Market-work versus home-work. Low lifetime earnings, hence low pensions, stem from two possible factors: low wage rates and low labor force participation. While some people earn low rates because they have chosen jobs that offer non-pecuniary benefits, most earn low rates for other reasons over which they have little control—lack of knowledge about how the labor market operates, limited quantity and quality of education (perhaps because they came from disadvantaged backgrounds), and discrimination are three possible reasons. Relatively little volition is involved; most people would prefer higher wage rates.

Differential labor market effort is a different matter. Strong social norms led women to work at home in the past, without much individual thought, variation or control. This was one reason some OECD countries adopted universal flat pensions—to redistribute to women who were expected to stay at home, with taxes paid by men and women who worked in the market. For the same reason, many traditional defined benefit systems that target public transfers to low earners, such as the US, also implicitly subsidize low labor force participation of women.⁵⁷

But social norms are now changing, market work by women is allowed and even expected in many countries, so the voluntary choice model may be increasingly applicable. If women have choice, it is less clear that those who have chosen to specialize in home-work should be subsidized. Subsidies for home-work and taxes on market-work

may lead them to do less of the latter, even though this leads to lower labor supply and output for the broader economy (for evidence from the US that women respond to such incentives, see Munnell and Soto 2005, Munnell and Jivan 2005). This may be one reason why some OECD countries have been shifting away from universal flat benefits in recent years.

Our three sample countries have taken very different positions on this issue. Of course, in all three countries the private annuity strongly rewards market work. But very different patterns apply to the public benefit. Mexico's social quota lets a person accept the consequences of his or her decision and gives a larger public benefit to those who work more in the market, with little protection for those who choose to work less. Chile truncates the bottom end of the pension distribution, providing an income floor to those with a combination of low wages and partial labor force attachment. Argentina redistributes to those who have stayed out of the formal labor market for most of their adult lives. As a result, average women with low education who work around twenty years are subsidized in Chile; full career women in the bottom half of the wage distribution get the largest net benefit in Mexico; and a huge net benefit goes to women who work only ten years in Argentina. Thus, the ratio of public benefits received by a full-career or an average woman relative to a ten-year woman is much higher in Mexico than Argentina, while for Chile this ratio is largely irrelevant. This relatively lower payoff may discourage women from market work in Argentina. All three countries mitigate the danger of poverty for very old women who haven't worked by requiring that husbands continue compensating for past services in the home, even after death, through joint pension arrangements.

Actually, many countries are now in a period of transition, from the world of our mothers, who were likely to stay at home, to the world of our daughters, who are likely to work in the market. Women are getting more education, and those with more education are likely to work in the market. Even within educational categories, women's labor force participation has gone up (see chapter 3). A higher proportion of women remain single, and single women are likely to work almost as much as men. Therefore, in thinking about this question it may be useful to separate out older cohorts of women (say, those over age 50), who lived much of their lives under the old set of social norms, versus younger

cohorts, who are growing up under a different set of norms that give them greater choice. The former group is dependent on the safety net but the latter group has an opportunity to build its own pension rights. It would seem that public policy should beware of subsidizing the decision to stay at home for younger cohorts, and should structure its future public benefit to offset low wage rates but not low labor force participation.

Marital status. Much of the low market work of women in the past stemmed from an implicit family contract that the women should provide services in the home, while men sell their services in the market in order to generate monetary income for the family. If these women had worked in the formal labor market they would have attained greater financial independence. But they and their families would have foregone some of the household services they provided that are valued, in particular child-care and elder care. In this sense, their low lifetime earnings result from exchanges made by the women and their families.

We saw in chapter 1 that in our sample countries families do indeed provide considerable support for older women in return for these household services. At first married women live in nuclear households where most of the monetary income is provided by their husbands. Later, as widows, many move to extended families where their children cover their monetary costs. Intra-family transfers also play a role. Family support has the advantage that it does not incur tax costs and distortions. It avoids imposing a cost on workers (including working women) who have not benefited from the household services provided by wives.

However, it has the disadvantage that it cannot always be relied upon. Single and divorced women or those without children don't have access to these family resources, and some married women with children also fall between the cracks, especially as they enter very old age. Husbands may not always share their wealth with wives, in particular they may not provide for their widows, and extended families may not adequately compensate wives and mothers for the non-market work they have performed. Women who cohabit with men without a formal marriage contract may have no legal recourse when support fails. Women's bargaining power within the family, which in many cultures was low to begin with, becomes even lower in old age. They may have thought they had a lifetime implicit contract, but husbands and children may default at a point

when it is too late for them to make other arrangements. If older women are left with a very low standard of living, this becomes a social problem.

One option is to recognize that family support is unreliable, and therefore the social security system must take over the whole job. This has led to the development of non-contributory programs, spousal benefits for contributors and widow's benefits in the public pillar in many countries. Such programs, however, may crowd out the remaining family support systems. They impose taxes on those who work, are single and have not benefited from household services, which may encourage escape to the informal sector. Ironically, low earning women who are not married may end up paying higher taxes yet receiving lower benefits than the spousal and widow's benefits received by middle class married women—a problem, for example, in the US social security system.⁵⁸ Married women who work may be required to give up their own annuity to get the widow's benefit. Since they receive no additional benefit for their contributions, their work may be discouraged and their dependent state perpetuated (Munnell and Soto 2005, Munnell and Jivan 2005).

Another option is to adopt public policies that reinforce family responsibility, thereby reducing the necessary tax on others and increasing the funds that can be allocated to cases where women are in greatest risk of poverty. The Latin American requirement that distribution of retirement assets be spread over the lifetimes of both spouses, via joint annuities or joint gradual withdrawals, is an example. Australia does not require joint annuities (or even individual annuities) but allows contribution-splitting and family contributions to the accounts of wives who are temporarily not working. Perhaps to become truly effective such measures would have to become mandatory. Practically no country has instituted regulations on splitting of assets upon divorce, so legal family responsibility would seem to end at that point—the woman takes on that risk when she marries. Many of the transition countries have not yet required joint annuities, but some of them are cutting back on public widows' benefits—which leaves older women at risk of having meager incomes and facing cuts in their standard of living since neither public nor family responsibility is left.

Given scarce public resources, as well as the income needs of older women with low earnings because they have provided services to their families instead, it would seem that the family should be required to reciprocate for these services by providing:

- survivors' benefits while of working age and joint annuities after retirement,
- as an increment to rather than a substitute for woman's own annuities;
- accumulation-sharing upon divorce;
- incentives for family contributions to the accounts of non-working wives or split contributions between spouses;
- and similar arrangements for those formally co-habiting without marriage.

This would provide income for older middle and upper class women, thereby allowing lower earning workers and their families to become the first priority for the public pillar.

Chapter 9: Conclusion

Tables 9.1 summarize some of our results for Chile, Argentina and Mexico. Our empirical investigations show that

(1) Women who work in the formal labor market have their own retirement savings accounts in the new systems. For many it is the first time they have had savings of their own.

(2) These accumulations and the pensions that they finance are smaller than those of men—only 20-50% as large--due to lower lifetime employment, earnings and contributions, as well as earlier retirement.

(3) However, because they tend to be low earners, women are recipients of net public transfers that raise their monthly and lifetime benefits—especially if the public benefit is wage-indexed.

(4) Additionally, if the reference wage is based on estimated earnings for time worked rather than full-time estimated earnings, women end up with replacement rates that are close to and sometimes greater than those of men, despite their fewer years of contributions.

(5) Women are also beneficiaries of regulations that require joint pensions in the private pillar. Women tend to outlive men, so joint pension requirements systematically redistribute from husbands to wives.

(6) Consequently, in most cases married women have gained more than married men from the reforms—the lifetime gender ratio has improved.

(7) Also in most cases full career women, both married and single, improved their positions relative to men. This stems from the actuarial linkage of annuity benefits with lifetime earnings as well as the joint pension requirements in all three countries.

The removal of penalties for labor market work plays an important role in producing these results. In the new systems women do not have to give up their own benefit to qualify for the widow's benefit that was purchased by their husbands in the form of a joint pension, so retirement income is higher for working women than for non-working women. Also, in the new systems women get credit, compounded with interest, for their contributions made early in life, while old system benefits depended heavily on

wages and contributions toward the end of the working career, a formula that favored men with rising age-earnings profiles. As discussed in Chapter 2, women will increasingly work more as they acquire more education. Beyond that, these pro-work policies are likely to move the average woman closer to the “full career women.” Work incentives and gender ratios would improve much further if the retirement age for men and women were equalized.

While women as a group gained in relative position, different sub-groups of women benefited the most in each case—a consequence of their differing policies in the new and old systems. The biggest gainers among women tend to be low earners. In all three countries, lifetime benefits of women in the lower educational groups are projected to rise post-reform relative to women in the higher groups. In Chile and Argentina married women gain relative to otherwise comparable single women, because they can keep their own pension in addition to the joint pension (in Mexico they did so in the old system as well). In Chile and Mexico full career women gain more than ten-year women, consistent with the work incentives in the new systems. In fact, in Chile, the position of ten-year women actually falls, relative to men with the same education. But in Argentina, ten-year women register larger relative gains because of the flat benefit for retirees with only ten years of work. This may slow down the shift to market work.

Some caveats and gaps:

(1) Single women and those cohabiting without a formal marriage contract receive much lower lifetime benefits than men or married women, because they have lower wages and greater longevity than men and don’t gain from the joint annuity, as do married women. Even if they work full career, their pensions will be relatively low so long as their wage rates remain relatively low. Concerns about single women could be addressed through measures such as the use of unisex mortality tables (which redistribute from men in general to women in general) or wage indexation of public benefits for the very old (which redistribute to those who live longer). Moreover, they can improve their own situation substantially by raising their retirement age to parity with that of men and working like full career women—and many of them do just that.

(2) The fact that women can keep their own-pension in addition to the joint pension encourages formal sector work for married women. But the terms of the reduced

flat benefit in Argentina and the MPG in Chile could discourage such work by low earning women after 10 and 20 years of contributions, respectively. Moreover, the earlier allowable retirement age of women in Chile and Argentina reduces their years of work and increases their years of pensioning, hence is a major reason for their relatively small pensions.

(3) All workers, and especially women, benefit from automatic price-indexation of the social quota in Mexico and the private annuity in Chile. However, the public benefit is not price-indexed in Argentina and price-indexation of the private annuity will be difficult in Mexico, without the availability of indexed financial instruments in which insurance companies can invest. Price indexation of the on-going pension after retirement is especially important to women given their greater longevity. Moreover, if the public safety net received by successive cohorts doesn't rise in real value through time, it will gradually diminish in size relative to workers' wage and average standard of living in society, and its equalizing impact will disappear for future generations of women. (Chile has increased its minimum pension with wage growth on an ad hoc basis, so its long run impact will be much greater than for a price-indexed MPG).

(4) Finally, this study deals mainly with women who are in or have husbands in the contributory social security system. It does not deal with the large group of rural women in low-income countries who do not meet these criteria and may have little income or savings when they become old. As briefly discussed, a non-contributory component to the old age program, which might be mean-tested or flat, would solve this problem, but means-tested programs face daunting administrative hurdles while flat benefits are costly and must compete with other pressing social needs.

The favorable outcome we have described for women in Latin America contrasts with outcomes in the transition economies of Eastern Europe and the former Soviet Union, where preliminary investigations suggest that women lost relative to men from the pension reform, due to the earlier retirement age for women, the less targeted public benefit, the weakening of survivors benefits, the failure to require joint pensions as of yet and the requirement that working women must continue to give up their own public benefit to get the widow's benefit if it exists (Castel and Fox 2000; Woycicka 2001).

Similarly, in Sweden the shift from a flat benefit to a minimum pension and the absence of survivors benefits have hurt women (Stahlberg et al 2006a and b).

Thus, the relative gains to women are not inevitable--detailed design features matter. Several key lessons emerge for policy-makers who wish to improve gender outcomes during a social security reform:

1. Rules of the system should not penalize or discourage women's work in the labor market. This means that:

- *Retirement age should be equalized for men and women.* While earlier retirement for women was a privilege in the old systems, it creates a problem in the new systems. Women who underestimate their longevity retire early, but may regret this when they age, their pensions are low and their choice is irreversible. Equalization of retirement ages between the genders would increase women's accumulations by 30% and their monthly pensions by 50% in Chile and Argentina. It ensures that lifetime retirement savings are allocated to old old age instead of young old age. It is especially important for single women who will not receive a boost from the joint pension. It increases the country's labor supply, savings and GDP.
- *Women who have built their own pension should not have to give it up to get the widow's benefit.* In many traditional systems, working women must choose between the two. Thus, women who work for much of their lives pay substantial contributions with no incremental benefit—the contribution is a pure tax. In contrast, in the new Latin American systems the widow keeps her own annuity as well as the joint annuity that her husband purchases. This raises her retirement income when old and also encourages her to work and contribute when she is young.
- *Women's contributions in early adult years should accumulate pension credits that keep pace with real wage growth and the real rate of return.* In many defined benefit systems, the reference wage earned by a woman who works in early adulthood loses real value due to inflation and relative value compared with the average wage in society by the time she retires. Her contribution, in effect, becomes worthless. In contrast, in defined contribution systems her

accumulated contributions increase with the rate of return, which usually exceeds wage growth. So her early years of work and contributions are rewarded. This may encourage formal labor market participation and add to pension saving and economic growth.

2. Individual accounts should be accompanied by a strong safety net, which protects low earners. Women are disproportionately low earners. The public benefit should:

- *Avoid eligibility conditions that exclude most women* (as in the 30-year requirement for Argentina's full flat benefit) or that impose a high marginal tax on women who qualify (as low earners face regarding in Chile's MPG). A continuous linkage to years worked (as in Mexico's SQ) is preferable to an on-off switch for eligibility;
- *Be price-indexed or partially wage indexed after the worker retires, to enable women to maintain a stable standard of living as prices rise* (not yet achieved in Argentina);
- *Rise with wages for successive cohorts once it has reached the desired long run level relative to the average wage* (done on an ad hoc basis in Chile);
- *Include a non-contributory component designed to keep out of poverty women who have not worked in the formal labor market* (as in Chile's PASIS program).

3. Payout provisions from the individual accounts strongly influence women's retirement security:

- *Annuitization, which provides a guaranteed income for life, is especially important for women in view of their greater longevity.* Retirement and other savings are more likely to be used up before death for women than for men, in the absence of annuitization. Annuitization requirements—at least up to 150% of the poverty line--should be built into the individual account system.
- *Inflation insurance of annuities is crucial for women because it helps maintain their real living standards as they age.* Private annuities are indexed in Chile but this will be difficult to achieve in other countries that don't have many indexed financial instruments;

- *Joint annuities purchased by the husband enable the widow to maintain the household's previous standard of living without imposing a burden on taxpayers.* It extends beyond the husband's death the informal family contract in which the he provides the majority of monetary support while the wife spends more time caring for the family. While this division of responsibility is changing, it will be many years before roles are totally equalized. Even then, a symmetrical joint pension requirements will insure both spouses. Importantly, it extends system coverage to many married women who have not worked in the formal labor market without imposing high fiscal costs.
- *Legal protections are needed to split assets or provide a joint pension for divorced women and women cohabiting without formal marriage.*
- *The use of unisex mortality tables needs to be carefully thought through.* Unisex pricing of individual annuities redistributes from men as a group to women as a group, so a value judgment is needed on whether this redistribution is desirable and, if so, is this the best way to achieve it. It leads to creaming and selection problems, but these can be mitigated by risk adjustment mechanisms or concentrated annuity provision based on competitive bidding. Unisex reduces the opportunity cost of joint annuities and joint annuities largely eliminate the impact on payouts of unisex tables, for married couples.

Within this broad framework for gender friendly policies, details of the “best” design pattern will vary, depending on a country's social objectives and budget constraints. Chile, Argentina and Mexico have implicitly defined gender equity differently and have made different trade-offs between poverty prevention, broader pension gender equality, work incentives and fiscal cost. These choices reflect different value judgments and political compromises.

While our focus in this study was on multi-pillar reforms, and most of our examples were from countries that had made such reforms, many counterpart policy choices could also be made in traditional pay-as-you-go systems, such as the US. For example, some traditional systems still permit women to retire earlier than men. This reduces the size of women's pension, which contributes to the heavy incidence of female

poverty in later years, and at the same time it implies a larger aggregate public expenditure on women's pensions in young-old age, which impedes the systems' fiscal sustainability and its ability to target assistance those who need it most. Equalized retirement ages should surely be part of a program of gender equality. The US already has equal retirement ages, and other OECD countries either have it or are now moving toward it.

Many countries with traditional systems provide widow's benefits based on the husband's pension size, without requiring the husband to finance it. Since the money then comes out of the public purse, women are often required to give up their own pension to get the widow's pension (which is larger). The US is an example of countries that have such provisions. This is likely to deter women's market work, since the payroll tax has no corresponding benefit to them. While appearing to favor women, it really keeps them in a state of dependence on their husband's earnings. These systems could require married men to finance the widow's benefit by taking a reduced pension of their own, and could then allow women to keep the widow's benefit in addition to their own-pension. This will help to make them more independent and less likely to suffer a steep fall in standard of living when their husband dies.

A strong safety net that protects low earners and that rises with the wage level for successive cohorts, is essential for women. Most OECD countries have such a safety net in the form of a flat or broad means-tested pension, but the US has no minimum pension and only a narrow means-tested benefit. As a result, poverty among older women is higher in the US than in other OECD countries, and if the US moves toward pure price indexation of benefits for future cohorts, the relative position of older women will further deteriorate. A wage-indexed minimum pension for the very old would improve the situation of women at the low end of the income spectrum.

In some countries, such as the US and UK, traditional defined benefit public systems are accompanied by voluntary private pension programs. In these cases, it is important that legal protections give widowed and divorced women access to part of the retirement savings that were accumulated by their husbands during the marriage.

More broadly, policies that improve women's labor market role during the working stage, will also improve them during the retirement stage, both in the traditional

and newer multi-pillar systems. Indeed, this is the only way to ultimately achieve gender equality.

Table 1.1: Living Arrangements of Men and Women Age 60+**A. Marital Status (%)**

	Chile		Argentina		Mexico	
	Men	Women	Men	Women	Men	Women
Married	76.5	46.3	76.4	42.0	74.2	42.6
Widow	13.6	41.3	12.5	45.4	15.0	46.7
Single+divorced	9.9	12.4	11.1	12.6	10.8	10.7

B. Household structure (%)

Nuclear	50.1	34.5	69.2	41.7	56.6	41.5
Extended	42.8	52.5	22.3	36.6	34.4	45.6
Uniperson	7.1	13.0	8.4	21.7	8.9	12.9

Sources: For Chile, data in all tables in this book are for urban areas. Unless otherwise noted, they are authors' calculations from the micro data set the Caracterizacion Socioeconomica Nacional (CASEN), a nationally and regionally representative household survey for 1994. Data for Argentina are authors' calculations based on the micro data set of Encuesta de Ingresos y Gastos (ENIGH INDEC), a nationally and regionally representative household survey for 1996-97. Data for Mexico are national averages for urban areas. They are authors' calculations based on the National Income and Expenditure Survey (ENIGH), 1996. The Mexican Health and Aging Study (MHAS) 2001 is also used for data on household structure. For more details on data in Table 1 see Cox Edwards (2000 and 2001), Wong and Espinoza 2006.

Table 1.2: Own-income of the Elderly in US\$ 2002, by Gender

A. Chile

	Men		Women	
	% with income	Average amountUS\$*	% with income	Average amountUS\$*
Salary	37.8	275	11.2	169
Imputed rent	72.2	65	37.7	56
Pensions	70.1	224	59.7	129
--old age and disability	62.0	240	30.9	141
--disability	5.6	116	4.5	87
--survivors (widows)	1.2	227	19.4	139
--PASIS (social assistance)	3.2	28	6.2	28
Total	97.6	407	73.5	195

B. Argentina

Salary	19.1	128	8.0	75
Interest and rent	3.4	79	2.5	50
Family transfers	7.7	29	6.2	35
Pensions	49.7	68	48.3	51
Total	66.5	99	54.7	63

C. Mexico

Salaries	21.3	358.9	3.3	257
Self-employed	40.1	489.9	13.6	147
Interest and rent	4.0	484.5	2.4	531
Family transfers	15.0	251.2	17.5	185
Pensions--all	19.4	260.2	9.0	140
--old age and disability	19.4	260.2	3.0	na
--survivors (widows)	0	na	6.0	na
Other	.7	299.7	1.0	562
Total	79.5	488.5	36.9	271

Sources: Edwards (2000 and 2001), Table 11; Parker and Wong (2001), Tables 8.14 and 8.9. (Estimates based on 1994 data for Chile, 1996 data for Argentina and 1997 data for Mexico, transformed into 2002 US\$'s).

* monthly amounts for those who have this income source.

Table 1.3: Income Per Capita and Poverty Rates in Urban Areas by Age, Gender and Household Structure, Using Equivalence Scales*

A. Monthly income per capita by number of elderly in household—in US \$'s 2002**

# elderly in hh	Chile		Argentina		Mexico
	Unadj.	OECD	Unadj.	OECD	NA
none	167	270	64	95	
1	197	278	66	87	
2	214	313	60	112	

B. Poverty rates among households by # elderly in household(%)***

none	28.9	10.1	24.3	8.0	27.2
1	17.2	6.1	14.1	5.8	36.9
2	13.5	3.5	17.3	6.7	42.4

C. Poverty rates among individuals by age and gender (%)

0-17 M+F	40.1	13.4	45.3	14.3	40.0
18-59 M	24.6	7.5	25.5	7.9	29.4(M+F)
18-59 F	26.6	8.5	24.5	7.8	
60+ M	14.4	3.8	16.4	6.1	40.2
60+ F	15.6	5.5	14.7	6.0	39.0
70+ M	13.1	3.2	14.2	6.6	44.0
70+ F	15.4	6.1	14.2	6.6	42.8

D. Poverty Rates for elderly individuals by living arrangement and gender (%)

Males					NA
Uniperson	6.6	6.6	7.1	7.1	
Nuclear	8.7	2.6	14.8	5.4	
Extended	22.2	4.8	25.4	7.8	
Females					
Uniperson	7.7	7.7	5.6	5.6	
Nuclear	4.9	2.5	14.4	5.3	
Extended	22.4	7.0	21.3	7.1	

Sources: Edwards (2000 and 2001), Tables 5, 6, 7, 8, 10; Parker and Wong (2001), Tables 8.3, 8.4

* See text for definition of OECD equivalence scale.

** 1 elderly in household refers to uni-person or extended family household; 2 elderly usually refers to nuclear family of elderly. For Mexico this category includes a small number of households with more than 2 elderly.

***Poverty lines are used here to compare the relative positions of different groups within a given country. They should not be compared across countries because they were taken from different sources that used different definitions. For Chile poverty line and numbers are from World Bank. 1997. Chile: Poverty and Income Distribution in a High – Growth Economy 1987-1995. Report # 16377-CH. For Argentina, from Lee, Haeduck. 2000. Poverty and Income Distribution in Argentina: Patterns and Changes. The World Bank (LCSPP). Poverty level in Mexico is defined as per capita income below the 30th percentile, using the OECD equivalence scales.

Table 1.4: Do Older Members Increase or Decrease Living Standards of their Extended Family Households?—the Case of Chile*

Chile		
	% hh in each category	Average change**
Male elderly		
Increase	85%	\$58
Decrease	15%	-\$25
Female elderly		
Increase	44%	\$34
Decrease	56%	-\$45

Source: Edwards (2000 and 2001), Table 13. Based on unadjusted household per capita income.

* Original data are based in CASEN 1994. The values are reported here in 2002 US\$.

** These changes have to be compared to typical per capita household incomes of the order of US\$ 200 for Chile.

Table 3.1: Distribution of sample by schooling and selected ages (as % of rows)

CHILE—URBAN AREAS					
Age	Incomplete primary	Incomplete secondary	Secondary	4 years post-secondary	5+ yrs post-secondary
MALES					
31 – 35	12.85	28.04	31.94	14.76	12.41
46 – 50	34.64	16.23	23.43	13.63	12.07
61 – 65	56.92	12.76	17.86	4.39	8.07
Total	26.33	24.53	26.45	14.07	8.62
FEMALES					
31 – 35	9.01	22.21	33.21	23.13	12.43
46 – 50	35.45	16.33	20.1	17.67	10.45
61 – 65	64.76	8.49	13.69	7.68	5.38
Total	24.58	19.09	26.61	20.88	8.84
ARGENTINA—FULL LABOR FORCE					
Age	Incomplete primary	Incomplete secondary	Secondary	Some post-secondary	University degree
MALES					
31-35	7.18	49.70	19.78	14.65	8.7
46-50	15.1	51.60	14.24	10.01	9.05
61-65	24.28	52.01	12.40	5.27	6.04
Total	11.65	52.95	17.00	12.37	6.03
FEMALES					
31-35	5.93	36.21	19.04	28.48	10.34
46-50	13.88	42.80	17.51	15.07	10.74
61-65	34.04	46.78	8.30	8.78	2.11
Total	9.88	40.65	18.61	23.58	7.29
MEXICO—MORE-URBAN AREAS					
Age	0-5 years	6-8 years	9 years	10-12 years	13+ years
MALES					
31 – 35	8.49	21.85	20.23	23.33	26.10
46 – 50	20.66	29.55	11.61	13.43	24.75
61 – 65	43.48	32.97	5.71	6.70	11.14
Total	13.75	25.68	18.78	19.69	22.09
FEMALES					
31 – 35	9.60	20.22	12.61	28.79	28.78
46 – 50	22.45	32.24	8.42	23.35	13.54
61 – 65	57.50	17.86	3.13 (a)	7.31 (a)	14.20 (a)
Total	14.35	22.47	13.79	28.42	20.97

(a) Estimated on cell sample size < 30.

Table 3.2: Lifetime years of work of single and married women relative to representative women*

Chile					
Educational groups	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 yrs post-sec.	5+ yrs post-secondary
Married women	0.77	0.78	0.94	0.98	0.95
Single women*	1.73	1.68	1.54	1.33	1.13
Average men	1.54	1.57	1.43	1.18	1.08
Argentina					
Educational groups	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 yrs post-sec.	5+ yrs post-secondary
Married women	0.98	0.97	0.84	1.02	0.94
Single women	1.28	1.64	1.44	1.18	1.06
Average men	2.17	2.09	1.70	1.33	1.19
Mexico					
Educational groups	0-5	6-8	9	10-12	13+
Married women	0.78	0.78	0.83	0.94	1.01
Single women*	1.87	1.99	1.89	1.73	1.28
Average men	3.30	2.96	2.59	2.18	1.56

Source: Calculations by authors based on CASEN 94 for Chile, ENGH 1996-97 for Argentina, Census 2000 Sample, IPUMS for Mexico

Notes: * Estimated lifetime years of work must be viewed with caution since these tables are based on cross-sectional data, not longitudinal data. Representative woman and average man are defined as single until median age of marriage, married thereafter. Single woman is never-married woman in Mexico; never married + widows, separated and annulled in Chile and Argentina. In latter two countries never-married group cannot be separated from the others.

Table 3.3: Change in educational composition and labor force participation rates among women ages 26-55 in Chile, Argentina and Mexico, 1970-2000*

Educational groups	Incompl. primary	Incomplete secondary	Complete secondary	up to 4 yrs post-sec.	5+ yrs post-sec.	Total
Chile						
Labor force participation rates in each educational group (%)						
1970	37.5	41.1	45.4	70.0	75.8	41.7
2000	43.9	48.4	57.2	66.1	77.7	56.6
Shift in lfpr rate	6.4	7.4	11.8	-3.9	2.0	14.9
Share of total by educational group (%)						
1970	57.7	22.5	13.0	4.3	2.4	100
2000	15.1	28.5	28.6	16.1	11.7	100
shift in educational share	-42.6	5.9	15.5	11.8	9.3	0
Argentina						
Labor force participation rates in each educational group (%)						
1975	28.9	39.1	39.9	57.1	80.3	33.2
2000	53.3	58.6	64.3	70.1	83.4	65.2
Shift in lfpr rate	24.4	19.6	24.3	13.00	3.2	31.9
Share of total by educational group (%)						
1975	73.9	10.2	10.8	2.1	2.9	100
2000	28.7	15.6	21.8	11.6	22.2	100
shift in educational share	-45.1	5.4	11.00	9.4	19.3	0
Mexico						
Educational groups	0-5	6-8	9	10-12	13+	Total
Employment rates in each educational group (%)						
1970	15.3	22.3	26.8	47.3	39.0	19.1
2000	22.4	27.2	34.4	45.8	68.2	36.5
Shift in employment rate	7.0	4.9	7.6	-1.6	29.2	17.5
Share of total by educational group (%)						
1970	67.0	24.4	2.4	3.8	2.3	100
2000	24.1	25.8	18.4	17.2	14.6	100
shift in educational share	-43.0	1.4	16.0	13.3	12.3	0.0

Sources: Author's calculations using U of Chile Greater Santiago Area Employment Surveys, 1970 and 2000 for Chile; Encuesta Permanente de Hogares (Urban areas), 1975 and 2000 for Argentina; 1970 and 2000 Census, IPUMS for Mexico

Notes: for Argentina we compare 1975 and 2000; for Mexico we show employment rates, which are very similar to labor force participation rates.

Table 3.4: Decomposition of increased labor force participation rates of urban women in Chile, 1970-2000: increased schooling vs. increased work propensities within schooling groups (by age group)

Age groups	16-25	26-35	36-45	46-55	56-65	Total 16-65	Ages 26-55
Differences in Labor Force Participation between 1970 and 2000 (%)							
% in LF in 1970	39.2	45.7	41.6	35.3	18.5	38.6	41.6
% in LF in 2000	38.6	58.7	56.3	53.7	26.9	48.6	56.6
Change in LFP rate	-0.6	13.0	14.7	18.4	8.4	10.0	14.9
% change in LFP rate	-1.5	28.4	35.3	52.1	45.4	25.8	35.8
Differences in mean school years, 1970-2000							
Mean schooling in 1970	8.5	7.8	7.5	6.7	6.6	7.7	7.4
Mean schooling in 2000	12.1	11.9	11	9.9	9	11.1	11.1
Difference	3.6	4.1	3.5	3.2	2.4	3.4	3.7
% change in schooling	42.4	52.6	46.7	47.8	36.4	44.2	50.0
Decomposition of Difference in LFP rates using regression (Oaxaca) approach							
Difference due to change in propensity	5.0	5.8	7.4	17.8	8.7	9.4	9.4
Difference due to shift in schooling	-5.6	7.2	7.3	0.6	-0.2	0.6	5.5
Total	-0.6	13	14.7	18.4	8.5	10	14.9
% due to change in propensity	47.2	44.6	50.3	96.7	102.4	94.0	63.1
% due to shift in schooling	-52.8	55.4	49.7	3.3	-2.4	6.0	36.9
Total	*	100	100	100	100	100	100
Decomposition of difference in LFP using weighted proportions approach							
Difference due to change in propensity (1)	-6.5	1.2	9.0	11.4	6.8	3.0	6.8
Difference due to shift in schooling (2)	-4.4	11.2	9.2	3.6	-1.8	3.4	8.9
Difference due to interaction (3)	10.3	.6	-3.5	3.3	3.5	3.5	-0.7
Total	-.6	13.1	14.7	18.4	8.5	10.0	14.9
% due to change in propensity (1)	-30.7	9.5	61.4	62.2	80.3	30.4	45.5
% due to shift in schooling (2)	-20.7	86.0	62.3	19.8	-21.8	34.5	59.5
% due to interaction (3)	48.8	4.5	-23.8	18.1	41.5	35.1	-4.9
Total	*	100	100	100	100	100	100

Source: U of Chile Employment Surveys 1970 and 2000.

*Because net change is small but component parts are large, percentages are calculated over sum of absolute changes. Therefore the sum of absolute values is 100%.

(1) Change in participation weighted by each group's schooling share in 197

(2) Change in schooling weighted by each group's participation rate in 1970

(3) Residual = Difference between total change in LFP rates and the sum of (1)+(2)

Table 3.5: Decomposition of increased labor force participation rates of urban women in Argentina, 1975-2000: due to increased schooling vs. increased work propensities within schooling groups (by age group)

Age groups	26-35	36-45	46-55	56-65	Total 16-65	Ages 26-55
Differences in Labor Force Participation between 1975 and 2000						
% in LF in 1975	37.4	34.0	27.0	15.2	30.4	34.0
% in LF in 2000	65.7	67.5	62.0	45.1	61.7	65.2
Change in LFP rate	28.3	33.5	35.0	29.9	31.3	31.1
% change in LFP rate	75.6	98.5	129.4	195.9	102.8	91.3
Differences in mean school years, 1975-2000*						
Mean schooling in 1975	7.2	6.9	6.4	6.0	6.7	6.8
Mean schooling in 2000	11.9	11.1	10.2	8.8	10.7	11.1
Difference	4.7	4.23	3.9	2.8	4.0	4.3
% change in schooling	65.9	62.1	60.4	47.0	60.2	62.3
Decomposition of Difference in LFP rates using regression (Oaxaca) approach						
Difference due to change in propensity	13.4	24.8	26.5	27.8	22.1	11.1
Difference due to shift in schooling	14.9	8.7	8.5	2.0	9.2	20.1
Total	28.3	33.5	35.0	29.8	31.3	31.1
% due to change in propensity	47.3	74.0	75.7	93.3	70.6	35.5
% due to shift in schooling	52.7	26.0	24.3	6.7	29.4	64.5
Total	100	100	100	100	100	100
Decomposition of difference in LFP using weighted proportions approach						
Difference due to change in propensity (1)	15.9	24.6	29.7	29.1	23.1	23.0
Difference due to shift in schooling (2)	16.0	13.2	13.1	.8	13.1	14.3
Difference due to interaction (3)	-2.9	-4.3	-7.8	.03	-4.8	-5.4
Total	29.0	33.5	35.0	29.9	31.4	31.9
% due to change in propensity (1)	54.8	73.5	84.9	97.3	73.4	72.1
% due to shift in schooling (2)	55.3	39.3	37.5	2.6	41.7	44.9
% due to interaction (3)	-10.1	-12.8	-22.4	0.1	-15.1	-17.0
Total	100	100	100	100	100	100

Source: Encuesta Permanente de Hogares 1975 and 2000

* Years of schooling are authors' estimates. Data set gave school categories and we converted into years by using mid-point for each schooling level.

(1) Change in participation weighted by each group's schooling share in 1975

(2) Change in schooling weighted by each group's participation rate in 1975

(3) Residual = Difference between total change in LFP rate and the sum of (1)+(2)

Table 3.6 Decomposition of increased employment rates of urban women in Mexico, 1970-2000: due to increased schooling vs. increased work propensities within schooling groups (by age group)

Age group	16-25	26-35	36-45	46-55	56-65	Total 16-65	Ages 26-55
Difference in employment rates between 1970-2000							
% employed 1970	27.8	19.8	18.8	18.0	14.5	22.7	19.1
% employed 2000	32.0	37.9	38.8	29.2	16.4	34.0	36.5
Difference	4.3	18.1	19.9	11.2	2.0	11.3	17.4
% change in % Employed	15.5	91.7	105.6	62.3	13.7	49.8	91.1
Differences in mean school years, 1970-2000							
Mean School 1970 (years)	5.0	4.1	3.3	3.2	2.6	4.1	3.6
Mean School 2000 (years)	9.3	9.2	7.8	6.1	4.6	8.2	8.1
Difference	4.2	5.1	4.5	2.9	2.1	4.1	4.5
% change in mean schooling	84.3	125.5	134.1	89.8	80.1	100	125
Decomposition of Difference in % Employed using Regression (Oaxaca) approach							
Difference due to change in propensity	-2.2	7.7	12.1	6.2	-0.2	4.5	8.9
Difference due to shift in schooling	6.7	10.7	7.9	5.2	2.3	7.1	8.6
Total	4.5	18.4	20.0	11.4	2.1	11.6	17.5
Decomposition of Difference in % Employed using Weighted Proportions approach							
Due to change in work propensity (1)	1.7	6.6	8.5	5.1	0.1	3.5	6.7
Due to shift in schooling (2)	4.8	11.3	8.3	5.3	2.5	7.1	9.1
Interaction (3)	-2.1	0.4	3.2	1.0	-0.6	0.7	1.6
Total	4.4	18.3	20.0	11.4	2.0	11.3	17.4
% decomposition of difference in % employed							
% due change in work propensity (1)	38.3	36.2	42.6	44.6	6.4	30.7	38.5
% due shift in schooling (2)	108.8	61.8	41.6	46.9	122.7	62.7	52.1
% interaction (3)	-47.1	2.0	15.9	8.5	-29.1	6.6	9.3
Total	100	100	100	100	100	100	100

Source: Authors' calculations using Census Samples, Mexico 1970, 2000. IPUMS

Notes:

- (1) Change in participation weighted by each group's schooling share in 1970
- (2) Change in schooling weighted by each group's participation rate in 1970
- (3) Residual=difference between total change in LFP rates and the sum of (1)+(2)

TABLE 3.7: Basic Demographic and Economic Data

Summary Data	Argentina		Chile		Mexico	
	men	women	men	women	men	women
1. Among working age population (16-65):						
% currently employed	70.8%	40.0%	75.2%	38.0%	83.7%	44.1%
% ever employed	n.a.	n.a.	89.8%	70.5%	92.6%	78.5%
% affiliated to SSS	75.5%		66.6%	41.6%	31.6%	14.6%
2. Among older popul. (60+):						
% who receive own pension	49.7%	48.3%	67.6%	35.4%	30.5%	5.4%
% who receive other pensions			4.4%	25.6%	.03%	9.4%
% who live in extended families	22.3%	36.6%	42.8%	52.5%	35.9%	44.6%
% who get monetary transfers from extended family	7.7%	6.2%	NA	NA	15.0%	17.5%
3. Life expectancy:						
At age 60 (gender specific)	20.0	24.5	21.2	25.3	19.7	24.1
At age 65 (gender specific)	16.2	20.2	17.3	20.9	15.9	19.7
Unisex at age 65	18.3	18.3	19.2	19.2	17.9	17.9

4. Wages and Pensions

Average monthly wage (2002US\$)	\$661	\$445	\$335	\$245	\$401	\$285
Minimum W. (as % of average)	30.3%	44.9%	37.6%	51.4%	33.1%	46.3%
MPG or flat (as % of av. wage)	30.3%	44.9%	27%	37.2%	33.1%	46.3%
Social Assistance Pension	NA	NA	12.8%	17.6%	NA	NA
Poverty line (as % of av. wage)	23.6%	35.1%	21.8%	29.9%	NA	NA

For section 1, numbers are for urban population in household surveys described in Appendix. Data are from 1994 (Chile), 1996-97 (Argentina), and 1997 (Mexico).

For section 2, data are from surveys described in Appendix. For Argentina breakdown between own and other pensions is not available. For Mexico, data are from Parker and Wong (2001), using household survey data for country as a whole. Own pensions refer to old age, disability and severance; other pensions refer to widows and survivor benefits.

For section 3 data are for population as a whole, from World Bank mortality tables for the cohort retiring in 2040, used in our simulations. These are cohort tables that incorporate projected mortality improvement factors. Today's life expectancy in period tables based on cross-sectional data would be about 10% less.

For section 4, data refer to our sample and sample dates, as described in Appendix (minimum wage and flat benefit decline through time as % of average wage due to wage growth). As of 2002 Argentina and Mexico had no social welfare program targeted towards the elderly.

Table 4.1—Main features of Old and New Systems in Chile¹

	Old System	New System
Structure	PAYG defined benefit	Private pillar: funded individual accounts Public pillar: minimum pension guarantee (MPG)
Contribution rate	26%	12.5% to private pillar; ¹ MPG financed from general revenues
Benefits	50% of base salary + 1% for every year > 10 up to maximum of 70% of base salary	Private pillar: annuity or programmed withdrawals from accounts Public pillar: minimum pension guarantee (MPG)
Base salary	Average of last 5 years (final 3 years indexed)	Not relevant
Pensionable age	Men-65; women-60	For annuity: 65M, 60W or earlier if meet conditions; For MPG: 65M, 60W
Years for eligibility	10 years	20 years for MPG; no minimum for pension from accounts
Pension if worked fewer years	0	Pension from account
Indexation provisions	No automatic indexation	Price indexation of annuity; MPG price indexed but has risen faster, roughly on par with wages ad hoc
Minimum pension	Ad hoc minimum safter 10 years, no indexation	MPG (about 27% of average male wage) after 20 years' contributions
Widows	50% of husband's pension <i>or</i> own pension	60% of husband's pension (joint annuity) + own annuity

Notes:

1. Contribution rates given for individual accounts for Chile include 2.5- 3% of payroll for survivors and disability insurance plus administrative costs.

Table 4.2: Affiliation and Propensity to Contribute among Chilean Workers by Employment Status and Gender, 1994

Males				
Status	Employment Distribution	Total Employment	Affiliates Among the Employed	Contributors Among working Affiliates
Employer	3.87	107,027	60.55%	85.93%
Self-employed	21.80	603,020	44.48%	60.54%
Employee	71.19	1,968,742	89.01%	94.90%
Live-in domestic	0.05	1,334	100.00%	100.00%
Other domestic	0.09	2,532	73.50%	77.97%
Short-term commission	1.40	38,598	62.13%	76.97%
Unpaid family	0.45	12,364	15.67%	43.06%
Military	1.15	31,917	99.08%	99.95%
Total	100.00	2,765,534	77.60%	90.15%
Females				
Status	Employment Distribution	Total Employment	Affiliates Among the Employed	Contributors Among working Affiliates
Employer	2.38	36,757	59.77%	87.79%
Self-employed	17.85	275,358	33.09%	64.82%
Employee	59.14	912,578	88.79%	96.22%
Live-in domestic	4.54	70,044	79.62%	97.51%
Other domestic	12.16	187,666	51.36%	78.89%
Short-term commission	1.41	21,824	63.06%	81.70%
Unpaid family	2.26	34,835	27.15%	54.32%
Military	0.25	3,914	100.00%	100.00%
Total	100.00	1,542,976	71.46%	91.48%

Source: Calculations by authors based on CASEN94.

Table 4.3: Estimated Years of Contributions by Age, Education and Gender in Chile¹

Males

Age	Schooling				
	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post secondary
16 – 20	3.37	3.02	1.65	1.28	0.00
21 – 25	3.65	3.89	4.19	4.07	2.79
26 – 30	3.63	4.13	4.49	4.32	4.46
31 – 35	3.84	4.29	4.70	4.70	4.87
36 – 40	3.97	4.30	4.69	4.62	4.90
41 – 45	4.40	4.35	4.53	4.47	4.75
46 – 50	3.89	4.24	4.12	4.23	4.71
51 – 55	3.74	4.20	3.97	4.01	4.77
56 – 60	3.03	3.32	3.70	3.83	4.66
61 – 65	2.46	2.31	2.25	3.34	3.06
Total 16-65²	35.98	38.05	38.29	38.97	38.97
Density of contributions³	72%	76%	77%	78%	78%

Females

Age					
16 – 20	3.64	2.85	1.39	1.21	0.00
21 – 25	3.20	3.66	3.92	3.91	3.26
26 – 30	2.96	3.52	3.33	3.78	4.61
31 – 35	1.64	1.92	2.94	3.74	4.23
36 – 40	2.35	2.83	3.37	3.71	4.82
41 – 45	2.44	2.91	3.37	4.37	4.61
46 – 50	2.09	2.21	3.38	3.36	4.65
51 – 55	2.54	2.331	2.47	3.44	4.63
56 – 60	1.63	1.85	2.38	4.16	3.96
61 – 65	0.93	0.11	0.25	0.24	1.28
Total 16-65	23.42	24.17	26.80	32.92	36.05
Total 16-60²	22.49	24.06	26.55	32.68	34.77
Density of contributions³	50%	53%	59%	73%	77%

Source: calculations by authors from data in CASEN 94

Notes:

1. Based on years of contributions for a cross-section of adults in urban areas who are affiliated to the social security system. See Appendix and text for more details on data and methodology.
2. Total contributing years to normal retirement age, 60 for women and 65 for men.
3. Density of contributions = total contributing years to normal retirement age/total possible contributing years from age 16 to normal retirement age

Table 4.4: Estimated Average Monthly Wage by Age, Education and Gender in Chile

(urban areas, 1994 data in 2002 US\$'s)¹

Males

Age	Schooling				
	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post secondary
16 – 20	\$103	\$129	\$152	\$159	
21 – 25	\$128	\$152	\$185	\$248	\$653
26 – 30	\$141	\$176	\$225	\$324	\$747
31 – 35	\$146	\$198	\$278	\$408	\$1,005
36 – 40	\$159	\$216	\$316	\$466	\$1,093
41 – 45	\$184	\$241	\$365	\$518	\$1,127
46 – 50	\$196	\$299	\$461	\$563	\$1,341
51 – 55	\$190	\$267	\$421	\$516	\$1,242
56 – 60	\$193	\$284	\$413	\$587	\$1,132
61 – 65	\$170	\$256	\$337	\$502	\$1,071

Females

Age					
16 – 20	\$101	\$100	\$131	\$139	
21 – 25	\$103	\$127	\$158	\$199	\$373
26 – 30	\$111	\$123	\$172	\$349	\$484
31 – 35	\$110	\$138	\$190	\$272	\$542
36 – 40	\$109	\$146	\$224	\$288	\$635
41 – 45	\$122	\$166	\$286	\$375	\$652
46 – 50	\$127	\$174	\$281	\$436	\$443
51 – 55	\$131	\$158	\$327	\$322	\$463
56 – 60	\$133	\$196	\$352	\$313	\$591
60 – 65	\$122	\$131	\$244	\$328	\$761

Source: Calculations by authors based on data from CASEN 94

Notes:

1. Wage estimates are for full time workers in urban areas. Monthly wages would be somewhat lower if part-timers were included; however, most affiliates who work, work full time. For more details on data and methodology see Appendix and text.

Table 4.5: Gender differences in fund accumulation in Chile: Decomposition of male/female differences

(Based on 5% real return, 2% real wage growth, 1994 data in 2002 US\$000's)

	Incomplete Primary	Incomplete Secondary	Secondary	Up to 4years Post Sec	5+ years post secondary
Accumulated funds at retirement					
1. Woman retiring at 60 with 10 years contributions	\$7.0	\$8.3	\$10.8	\$17.2	\$27.6
2. Average woman retiring at 60	\$11.7	\$16.3	\$28.8	\$47.5	\$87.4
3. Average woman retiring at 65	\$15.3	\$20.9	\$36.9	\$60.9	\$114.6
4. Full career woman, retiring at 65	\$23.6	\$31.8	\$51.5	\$70.8	\$121.7
5. Men at 65	\$32.4	\$46.9	\$69.9	\$97.4	\$224.4
6. Men at 60	\$24.3	\$35.3	\$52.9	\$72.3	\$167.8
Fund ratios of women relative to men retiring at 65 (percentages)					
7. Woman retiring at 60 with 10 years contributions	22%	18%	16%	18%	12%
8. Av. woman retiring at 60	36%	35%	41%	49%	39%
9. Av. woman retiring at 65	47%	45%	53%	63%	51%
10. Full career woman, retiring at 65	73%	68%	74%	73%	54
11. Full career woman retiring at 65, male wages	100%	100%	100%	100%	100%
12. Men at 65	100%	100%	100%	100%	100%
13. Average women at 60/average man at 60	48%	46%	54%	66%	52%

Source: calculations by authors

Note: This table gives projected fund accumulations at retirement for young worker entering labor force today. Women with 10 years of contributions are assumed to work for ten years from ages 21-30. Average women retiring at 65 works as average women to 60, then keep money in account until pensioning at 65. Full career women are assumed to have same participation rate as men, working to 65, but earn same wage rate as other women. Normal retirement age for women is age 60. Normal retirement age for men is 65. Accumulations are also given for men at 60, since the majority of men meet the early retirement conditions, stop accumulating and start withdrawing before 65.

Table 4.6 Estimated Monthly Annuities from Individual Accounts in Chile

(Based on 5% real return in accumulation stage, 3,5% in annuity stage, 2% real wage growth, 1994 data in 2002 US\$'s)

	Incomplete primary	Incomplete secondary	Complete secondary	Up to 4 post secondary	5+ yrs post secondary
Average married males, monthly annuity (US\$'s)					
1. Annuity at 65	\$ 179	\$ 259	\$ 386	\$ 538	\$ 1,240
2. Annuity at 60	\$ 120	\$ 174	\$ 261	\$ 356	\$ 826
Females, monthly annuity (US\$'s)					
3. Average woman at 60	\$ 59	\$ 83	\$ 146	\$ 241	\$ 444
4. Average woman at 65	\$ 88	\$ 121	\$ 213	\$ 351	\$ 661
5. Full career woman at 65	\$ 136	\$ 183	\$ 297	\$ 408	\$ 702
6. 10-year woman at 60	\$ 36	\$ 42	\$ 55	\$ 87	\$ 140
Female annuity as % of annuity of average married man at 65 (percentages)					
7. Average woman at 60	33%	32%	38%	45%	36%
8. Average woman at 65	49%	47%	55%	65%	53%
9. Full career woman at 65	76%	71%	77%	76%	57%
10.10-year woman at 60	20%	16%	14%	16%	11%
11. Av. woman at 60/ av. man at 60	50%	48%	56%	68%	54%

Source: calculations by authors

Notes: This table gives projected annuity at retirement for young worker entering labor force today. For notes see Appendix and text. The MPG (\$78 monthly) is not included in this table. Married man is assumed to purchase joint annuity with 60% to survivor. Females purchase individual annuities. Gender-specific World Bank mortality tables for the cohort retiring in 2040 are used. Man is assumed to retire at normal age of 65, except for last row that gives comparison for men who retire early, at 60.

Table 4.7: Impact of public pillar on gender ratios of monthly pensions, Chile

(Based on 5% real return in accumulation stage, 3.5% in annuity stage, 2% real wage growth; 1994 data in 2002 US\$'s)

Education	incomplete primary	incomplete secondary	complete secondary	up to 4 post secondary	5+ years post secondary
Married Men					
1. Annuity at 65	\$179	\$259	\$386	\$538	\$1,240
2. % increase-MPG	0	0	0	0	0
3. Annuity+MPG at 80 if wage-indexed	\$291	\$291	\$386	\$538	\$1,240
Women					
4. Annuity at 60	\$59	\$83	\$146	\$241	\$444
5. Annuity+MPG	\$78	\$83	\$146	\$241	\$444
6. % increase-MPG	31%	0	0	0	0
7. Annuity+MPG at 60 if wage-indexed	\$172	\$172	\$172	\$241	\$444
8. Annuity+MPG at 80 if wage-indexed	\$291	\$291	\$291	\$291	\$444
9. MPG if retire at age 65, if full career woman or if 10-year woman	0	0	0	0	0
Average female/male ratios					
10. Own-annuity	33%	32%	38%	45%	36%
11. Annuity + MPG	44%	32%	38%	45%	36%
13. Annuity+MPG at 60 if wage-indexed	96%	66%	45%	45%	36%
14. Annuity+MPG at 80 if wage-indexed	100%	100%	75%	54%	36%

Source: calculations by authors

Notes: MPG was \$78 in 1994, in 2002 \$'s. It will retain same real value when young worker retires, if price-indexed. If wage-indexed, it will be \$172 in 40 years, when today's young worker retires. It will be \$291 20 years later, if wage-indexation continues to apply after the individual retires. We assume retiree annuitizes and MPG is used to top up annuity, if appropriate. See Appendix and text for more details. For comparison, poverty line was \$63 in 1994, in 2002 \$'s.

Table 4.8: Replacement rates in Chile (pension/reference wage)

	Incomplete primary	Incomplete secondary	Complete secondary	Up to 4 post secondary	5+ yrs post secondary
Replacement rates for average married male					
1. Annuity at 65	49%	50%	48%	54%	52%
2. Annuity at 60	33%	34%	32%	36%	35%
3. Annuity/Adjusted reference wage	66%	60%	60%	68%	54%
Replacement rates for females					
4. Annuity at 60	24%	27%	23%	39%	50%
5. Annuity at 65	35%	40%	34%	57%	74%
6. Full career woman at 65	54%	60%	47%	66%	79%
7. Annuity+MPG at 60	31%	27%	23%	39%	50%
8. Annuity+MPG if wage-indexed at 60	68%	57%	27%	39%	50%
9. Annuity+MPG/Adjusted reference wage	61%	58%	47%	57%	54%
Female/male replacement rate ratios					
10. Annuity--F60, M65	48%	54%	49%	72%	96%
11. Annuity—F65, M65	71%	79%	71%	105%	143%
12. Annuity, Full career woman at 65	110%	120%	99%	122%	152%
13. Annuity+MPG—F60, M65	63%	54%	49%	72%	96%
14. Annuity+MPG if wage-indexed—F60, M65	139%	112%	57%	72%	96%
15. Annuity+MPG/Adjusted reference wage—F60, M65	93%	97%	78%	84%	99%

Source: calculations by authors

Notes: Replacement rates are defined as pension/reference wage. Reference wage is defined as monthly wage rate at ages 51-55. Wage is from Table 4.4, indexed up by 2% wage growth to get wage young worker entering labor force today will receive when he or she is 51-55. Annuity is from Table 4.6 and MPG is from Table 4.7. For rows 3, 9, 15 reference wage is adjusted by percentage of time individual worked at ages 51-55, to obtain a measure of actual earnings (monthly wage rate*% time worked). All replacement rates are given for woman with average work history from Table 4.3, except that in rows 5 and 11 she retires at 65 and in rows 6 and 12 she is full career woman.

Table 4.9: The impact of joint annuities and unisex tables in Chile¹

(based on 5% return during accumulation stage, 3.5% during annuity stage, real wage growth= 2%; 1994 data in 2002\$'s)

Education	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post secondary
Males, retiring at 65					
1. Individual-gender specific	\$ 217	\$ 314	\$ 467	\$ 651	\$ 1,501
2. Individual-unisex	\$ 200	\$ 290	\$ 431	\$ 601	\$ 1,385
3. Joint-gender specific²	\$ 179	\$ 259	\$ 386	\$ 538	\$ 1,240
4. Joint—unisex	\$ 175	\$ 254	\$ 378	\$ 527	\$ 1,215
Females, retiring at 60					
5. Individual-gender specific²	\$ 59	\$ 83	\$ 146	\$ 241	\$ 444
6. Individual-unisex	\$63	\$88	\$156	\$257	\$ 472
7. Widow's annuity	\$ 107	\$ 156	\$ 232	\$ 323	\$ 744
8. Widow's + own annuity	\$ 167	\$ 238	\$ 378	\$ 564	\$ 1,188
9. Widow's pensions as % of H+W pensions³	70%	70%	71%	72%	71%

Source: calculations by authors

Notes:

1. The MPG is not included in annuity calculations. Joint annuity assumes 60% to survivor.
2. Corresponds to own-pensions in Table 4.6.
3. Own-annuity of wife + widow's annuity after husband dies relative to own-annuities of husband + wife while husband was alive

Table 4.10: Expected present value of gross lifetime benefits from own-annuities, joint annuity and public benefits in Chile

(Based on 5% return during accumulation stage, 3.5% during annuity stage, 4% discount rate, real wage growth = 2%; 1994 data in 2002 US\$000)

Education*	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 post sec.	5+ yrs post secondary
Average married man					
1. Individual annuity	\$32.4	\$46.9	\$69.9	\$97.4	\$224.4
2. Joint annuity	-5.6	-8.2	-12.2	-16.9	-39.0
3. Total—av. married man	\$ 26.8	\$ 38.7	\$ 57.7	\$ 80.5	\$ 185.4
Average women					
4. Own-annuity	\$13.9	\$19.4	\$34.3	\$56.5	\$104.0
5. MPG (price-indexed)	3.1	0	0	0	0
6. MPG (wage-indexed)	18.5	14.6	4.3	0	0
7. Joint annuity	6.3	9.1	13.5	18.8	43.3
8. Total (4+5+7)-m.woman	\$24.0	\$28.5	\$47.8	\$75.3	\$147.3
9. % incr. from p.-ind. MPG	22%	0%	0%	0%	0%
10.% incr. from w-ind MPG	133%	75%	13%	0%	0%
11.% incr. from joint annuity	45%	47%	39%	33%	42%
Full Career woman					
12.Own-annuity	\$23.6	\$31.8	\$51.5	\$70.8	\$121.7
13.Total-FC marr. woman	29.9	40.9	65.3	89.6	169.0
14.% incr. from joint annuity	27%	28%	26%	27%	36%
10 year woman					
15.Own-annuity	\$8.3	\$9.9	\$12.9	\$20.5	\$32.8
16.Total-10-year m. woman	14.6	19.0	26.4	39.3	76.1
17.% incr. from jt. annuity	75%	92%	105%	92%	132%
Married women/married men ratios					
18.Average woman	87%	73%	83%	94%	79%
19.FC woman	112%	105%	113%	111%	89%
20.10 yr woman	55%	49%	46%	49%	41%

Source: calculations by authors

Notes: EPV is given as of age 65. 3.5% rate is used to discount or compound all benefits to age 65. EPV of individual annuity for average man and FC woman are same as fund accumulations given in Table 4.5 for age 65. EPV of annuities for average and ten-year woman are larger than fund accumulations, because EPV is given as of age 65 while accumulations in Table 4.5 are given as of age 60. Husbands and wives are assumed to belong to the same educational group. Absolute amount of joint annuity benefit is same for average, full career and 10 year woman but it varies as % of own annuity. MPG varies by labor force attachment. For most rows it is assumed to be price-indexed. For row 6 it is assumed to be wage-indexed up to the point of retirement, but price-indexed thereafter. In Chile MPG top-up for married woman stops when MPG floor is reached due to joint annuity. Therefore % increment from MPG for married woman is less on lifetime than on monthly basis. Average man, FC woman and 10-year woman get no MPG. EPV of loss through joint annuity to man is less than EPV of joint annuity benefit to woman because EPV is measured as of age 65, which woman reaches 3 years later.

Table 4.11: Female/Male ratios of expected PV of lifetime benefits in new vs. old systems in Chile

Education	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post sec.
Old system (woman/average man)					
1. Average single woman	72%	56%	88%	91%	71%
2. Average married woman	73%	61%	88%	91%	73%
3. Full career single woman	82%	72%	94%	68%	70%
4. Full career married woman	82%	72%	94%	68%	70%
5. 10 year married woman	73%	52%	50%	54%	42%
New system (average woman/average man)					
6. Single-own annuity	52%	50%	59%	70%	56%
7. Single-own annuity +MPG (price-indexed)	64%	50%	59%	70%	56%
8. Single-own annuity +MPG (w-indexed)	121%	88%	67%	70%	56%
9. Married-own-annuity+MPG (p-ind.)+ joint annuity	87%	73%	83%	94%	79%
New system (full career woman/average man)					
10. Single	88%	82%	89%	88%	66%
11. Married	112%	105%	113%	111%	89%
New system (ten-year woman)					
12. Married	55%	49%	46%	49%	41%

Source: calculations by authors

Notes: Present values are measured at age 65 for both genders, including benefits that started for women at 60. Denominator is pension for married man. In old system single and married men got same pension. In new system married man gets smaller pension than single man, because he must purchase joint pension.

Single woman is assumed to have same work history as married woman, but does not get widow's benefit (joint annuity). Single and married full career women got same pension in old system, since their own pension outweighed widow's benefit. In new system, married full career women get joint pension in addition to their own pension.

MPG is assumed to be price-indexed, except for row 8. For average women, same price-indexed MPG is included in new and old systems, although in fact it was not price-indexed in old system. Full career women do not qualify for the MPG in new or old system. 10-year women are assumed to get MPG in old system but not new system.

Impact of 70% ceiling on replacement rate is not taken into account in this table, because data do not allow us to distinguish between those for whom it applied and did not apply. (Workers could evade this ceiling by changing sector of job or getting higher wage in final years). It was more likely to apply to men than to women. In cases where it applied, ratios of woman/man would have been higher, in old system.

Table 4.12: Ratios of Expected PV's of Post-Reform/Pre-reform Lifetime Benefits (relative to ratio for married men in top educational group) in Chile

(r = 5% during accumulation, 3.5% during annuity stage, real wage growth = 2%)

Education	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 post secondary	5+ yrs post secondary
Average Man					
1. Married Man	128%	118%	118%	94%	100%
2. Single Man	154%	143%	143%	114%	121%
Women					
3. Average—single	113%	106%	80%	73%	79%
4. Average—married	152%	142%	111%	97%	109%
5. Full career—single	138%	135%	113%	122%	94%
6. Full career—married	175%	174%	142%	154%	128%
7. Ten year—married	95%	112%	108%	84%	98%
8. Men + women: Average household	138%	127%	115%	95%	104%

Source: calculations by authors

Notes: Includes lifetime benefits from own-annuity, MPG and joint annuity. Each cell i shows $(PV_{new}/PV_{old})_i / (PV_{new}/PV_{old})_k$ where $(PV_{new}/PV_{old})_i$ = ratio of present value of lifetime benefits in new vs. old systems for group i. This is normalized by the ratio for reference group k, where k=married men in highest educational category. Groups in rows 3 and 5 do not include widow's benefit in old system or joint annuity in new system. If the number in a cell >100%, this means it gained more than top married men.

Table 5.1—Main features of Old and New Systems in Argentina¹

	Old System	New System
Structure	PAYG defined benefit	Private pillar: funded individual accounts <i>or</i> public defined benefit Public pillar: flat or reduced flat benefit
Contribution rate	27% (lower before 1994)	11% to Private pillar ³ 6-16% to Public pillar (varies by region and time)
Benefits ²	JO: 70% of base salary + 1% for every year over 30; JEA: 50% of base + 1% for every year over 10	Private pillar: annuity or programmed withdrawals Public pillar: flat benefit after 30 years work; <i>or</i> reduced flat at age 70 after 10 years
Base salary	Average of 3 highest annual salaries within last 10 yrs	Not relevant
Pensionable age	JO: Men-age 60; women-55 JEA: age 65	For annuity: 65M; 60W; or earlier if meet conditions; for flat: 65M, 60W; Reduced flat: age 70
Years for eligibility ²	JO: 20 years contributions (15 before 1991); JEA: 10 years service	30 years for full flat benefit 10 years for reduced flat No minimum requirement for pension from account
Pension if worked fewer yrs	0	Pension from account
Indexation provisions	No automatic indexation	Ad hoc for public benefit; not yet determined for annuity
Minimum pension	Ad hoc minimum after 10 years service, no indexation	Minimum pension fixed on ad hoc basis, no indexation
Widows	75% of husband's pension and/ <i>or</i> own pension	70% of husband's annuity + 70% husband's flat benefit + own pension

Notes:

1. Argentina had special provisions for the self-employed and many special regimes. We focus here on the main scheme for employees.

2. JO= Jubilacion Ordinaria; JEA = Jubilacion por Edad Avanzada. Under the old system, the JO applied to those with 20 years of contributions, while the smaller JEA applied to those with at least 10 years of contributions.

3. Fees for survivors and disability insurance plus administrative costs are taken out of this contribution rate. Initially these fees totaled 3.25%. Currently they are about 2.5%.

Table 5.2: Contributions Density among Affiliates by Employment Status in Argentina

Employment Status	Employee	Self - Employed	Mixed	Domestic Service	Voluntary	Total
0%	17.7	21.4	1.2	8.7	46.6	18.4
1 - 16%	10.2	18.9	2.2	12.1	9.3	11.9
17 - 27%	5.8	8.9	1.9	4.4	5.6	6.4
28 - 50%	9.4	9.5	2.2	10.1	18.5	9.4
51 - 69%	8.8	7.1	4.8	10.6	2.8	8.4
70 - 83%	6.6	4.9	4.1	4.9	2.0	6.2
84 - 99%	12.8	14.6	14.5	22.6	9.8	13.2
100%	28.6	14.7	69.1	26.6	5.3	26.1
Total	100	100	100	100	100	100

Source: SAFJP and ITdT (1999)

Table 5.3: Estimated Years of Work by Age, Education and Gender in Argentina¹
Males

Age	Schooling				
	Incomplete primary	Incomplete secondary	Complete secondary	up to 4 post secondary	5+ year post secondary
16 – 20	3.25	2.33	3.85	1.67	0.00
21 – 25	3.94	4.53	4.53	3.17	4.69
26 – 30	4.27	4.78	4.85	4.39	4.92
31 – 35	4.20	4.87	4.93	4.73	4.94
36 – 40	4.66	4.75	4.89	4.97	4.90
41 – 45	4.68	4.80	4.87	4.94	4.89
46 – 50	4.54	4.68	4.86	4.86	4.93
51 – 55	4.29	4.51	4.42	4.64	4.81
56 – 60	3.86	3.99	3.96	3.88	4.65
61 – 65	1.24	1.41	1.66	1.89	2.08
Total 16-65²	38.93	40.74	42.82	39.14	40.86
Density of work³	78%	81%	86%	78%	82%

Females

Age					
16 – 20	1.60	1.31	3.27	1.16	0.00
21 – 25	1.11	2.44	4.32	2.92	4.58
26 – 30	1.87	1.91	2.22	3.72	4.63
31 – 35	2.10	2.30	2.62	3.61	4.31
36 – 40	2.32	2.47	2.65	2.89	4.18
41 – 45	2.58	2.55	2.93	3.98	4.18
46 – 50	2.37	2.53	2.93	3.75	4.61
51 – 55	2.12	1.88	2.29	3.15	3.97
56 – 60	1.38	1.70	1.63	2.54	3.31
61 - 65	0.47	0.44	0.40	0.77.	1.34
Total 16-65	17.92	19.53	25.26	29.49	34.43
Total 16-60²	17.45	19.09	24.86	28.72	33.09
Density of work³	39%	42%	55%	64%	74%

Source: calculations by authors based on ENGH 1996-97

Notes:

1 Based on labor force experience of a cross-section of adults (affiliates+non-affiliates) in urban areas covering most of the Argentine population. On marital status see footnote for Chile. For details on data sources see Appendix.

2 Total contributing years among workers to normal retirement age, 60 for women and 65 for men.

3 Density of work = total working years to normal retirement age/total possible contributing years from age 16 to normal retirement age. We define “low density worker” as one who contributes only 60% of working time.

4. Table 5.4: Estimated Average Monthly Wage in Argentina
(urban areas, 1996 data in 2002 US\$'s)¹

Males

Age	Schooling				
	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ year post secondary
16 – 20	\$68	\$102	\$121	\$150	
21 – 25	\$121	\$163	\$179	\$194	\$417
26 – 30	\$137	\$196	\$268	\$286	\$502
31 – 35	\$177	\$230	\$328	\$370	\$629
36 – 40	\$164	\$235	\$382	\$433	\$710
41 – 45	\$183	\$273	\$388	\$419	\$895
46 – 50	\$194	\$269	\$425	\$566	\$809
51 – 55	\$181	\$260	\$509	\$447	\$801
56 – 60	\$176	\$272	\$320	\$316	\$775
61 – 65	\$142	\$223	\$335	\$342	\$843

Females

Age					
16 – 20	\$67	\$80	\$117	\$92	
21 – 25	\$77	\$117	\$141	\$167	\$274
26 – 30	\$82	\$123	\$169	\$211	\$365
31 – 35	\$121	\$134	\$238	\$225	\$371
36 – 40	\$130	\$148	\$245	\$249	\$379
41 – 45	\$118	\$149	\$247	\$318	\$393
46 – 50	\$108	\$134	\$256	\$271	\$519
51 – 55	\$119	\$142	\$227	\$321	\$545
56 – 60	\$102	\$142	\$263	\$228	\$372
60 – 65	\$96	\$138	\$428	\$378	\$627

Source: Calculated by authors based on data in ENGH 1996-97

Notes:

Wage estimates are based on all workers (both full time and part time) in metropolitan areas. For more details on data and methodology see Appendix.

Table 5.5: Gender differences in fund accumulation in Argentina: Decomposition of male/female differences (in 2002US\$000's)

(Based on 5% real return, 2% real wage growth, 1996 data using 2002 US\$000's)

	Incomplete Primary	Incomplete Secondary	Secondary	Up to 4years Post Sec	More than 4 years Psec
Accumulated funds at retirement (in 2002 US\$000's)					
1. Woman retiring at 60 with 10 years contributions	\$4.5	\$6.7	\$8.6	\$10.5	\$17.7
2. Average woman retiring at 60	6.5	9.3	18.4	25.7	50.3
3. Average woman retiring at 65	8.4	12.1	23.8	33.2	64.7
4. Full career woman retiring at 65	18.2	25.1	40.9	42.8	74.4
5. Men at 65	27.7	42.2	63.2	65.5	126.9
6. Low density man at 65	16.6	25.3	37.9	39.3	76.1
7. Low density woman, 60	3.9	5.6	11.0	15.4	30.2
Fund ratios of women relative to men retiring at 65 (percentages)					
8. Woman retiring at 60 with 10 years contributions	16%	16%	14%	16%	14%
9. Average woman retiring at 60	24%	22%	29%	39%	39%
10. Average woman retiring at 65	30%	29%	38%	51%	51%
11. Full career woman retiring at 65	66%	59%	65%	65%	59%
12. Full career woman retiring at 65, male wages	100%	100%	100%	100%	100%
13. Men at 65	100%	100%	100%	100%	100%
14. Low density woman at 60/ low density man at 65	24%	22%	29%	39%	40%

Source: calculations by authors

Notes: This table gives projected fund accumulations at retirement for young worker entering labor force today. Average women retiring at 65 works as average women to 60, then keep money in account until pensioning at 65. Women with 10 years of contributions work ten years from age 21 to age 30. Full career women work with same intensity as men but earns the same wages that other women earn. Low-density worker contributes only 60% of the time he or she works.

Table 5.6: Estimated Monthly Annuities from Individual Accounts in Argentina¹
 (Based on 5% return in accumulation stage, 3.5% in annuity stage, 2% real wage growth, 1996 data using 2002 US\$'s)

	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree
Average married males, monthly annuity (US\$'s)					
1. Annuity at 65	\$ 153	\$ 233	\$ 349	\$ 362	\$ 701
2. Low-density at 65	92	140	209	217	421
Females, monthly annuity (US\$'s)					
3. Average woman at 60	\$ 32	\$ 46	\$ 91	\$ 127	\$ 248
4. Average woman at 65	47	67	132	185	360
5. Full career woman at 65	101	140	228	238	414
6. 10-year woman at 60	22	33	42	52	87
7. Low-density woman at 60	19	27	53	74	145
Ratio of female annuity to annuity of average married man (percentages)					
8. Average woman at 60	21%	20%	26%	35%	35%
9. Average woman at 65	31%	29%	38%	51%	51%
10. Full career woman at 65	66%	60%	65%	66%	59%
11. 10-year woman at 60	14%	14%	12%	14%	12%
12. Low-density women at 60/ low density man at 65	21%	19%	25%	34%	35%

Source: calculations by authors

This table gives projected annuities at retirement for young worker entering labor force today. For notes see Appendix. Flat benefit is not included in this table. Married men and women in Argentina both must purchase joint annuity with 70% to survivor. Gender-specific tables are used. Low-density means individual contributes 60% of the time he or she works.

Table 5.7: Impact of public benefit on gender ratios of monthly pensions, Argentina
(based on: 5% return in accumulation stage, 3.5% in annuity stage, 2% real wage growth; 1996 data in 2002 US\$'s)

Education*	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree
Married men					
1. Annuity at 65	\$ 153	\$ 233	\$ 349	\$ 362	\$ 701
2. Annuity + flat	\$ 230	\$ 310	\$ 426	\$ 439	\$ 778
3. % increase-flat	50%	33%	22%	21%	11%
4. Low density—annuity + flat	\$ 146	\$ 194	\$ 263	\$ 271	\$ 475
Women					
5. Annuity at 60	\$ 32	\$ 46	\$ 91	\$ 127	\$ 248
6. Annuity+flat-60	\$ 32	\$ 46	\$ 91	\$ 127	\$ 325
7. Annuity+flat-70	\$ 86	\$ 100	\$ 145	\$ 181	\$ 325
8. % incr. by flat	169%	118%	60%	43%	31%
9. Full career—annuity+flat	\$ 178	\$ 217	\$ 305	\$ 315	\$ 491
10. % increase by flat-FC at 65	76%	55%	34%	32%	19%
11. 10-yr woman—annuity+flat at 70	\$ 76	\$ 87	\$ 96	\$ 106	\$ 141
12. % incr. by flat-10-year women at	244%	164%	128%	104%	62%
13. Low density at 70—annuity+flat	\$ 73	\$ 81	\$ 107	\$ 128	\$ 199
Female/male ratios (percentages)					
14. Own-annuity	21%	20%	26%	35%	35%
15. Annuity + flat (at 65)	14%	15%	21%	29%	42%
16. Annuity + flat (at 70)	37%	32%	34%	41%	42%
17. Annuity+flat, (FC at 65 or 70)	77%	70%	71%	72%	63%
18. Annuity+flat (10 yr. at 70)	33%	28%	23%	24%	18%
19. Low density F/ low density M (70)	50%	42%	41%	47%	42%

Source: Calculations by authors

* This table gives projected pensions at retirement for young worker entering labor force today. Full flat benefit of \$77 begins at age 60 for women, 65 for men, after 30 years of contributions. Full career woman retires and begins full flat at 65. Reduced flat of \$54 begins at age 70; ten years of contributions are required for eligibility. Flat benefit is treated as if it is price-indexed, although it is not. For comparison, the poverty line in Argentina was \$60 in 1999, in 2002 US\$'s. Men and women with low density of contributions contribute 60% of the time they work.

Table 5.8: Replacement rates in Argentina (pension/reference wage)

	Incomplete primary	Incomplete secondary	Complete secondary	Up to 4 post secondary	5+ yrs post secondary
Replacement rates for average married male, retirement age=65					
1. Annuity only	44%	47%	36%	42%	46%
2. Annuity+flat	66%	62%	44%	51%	51%
3. Annuity+flat/adj. reference wage	77%	69%	49%	55%	53%
4. Annuity+flat, low density	42%	39%	27%	32%	31%
Replacement rates for females					
5. Annuity only	14%	17%	21%	21%	24%
6. Annuity + flat	38%	37%	33%	29%	29%
7. Annuity+flat, full career woman at 65	78%	79%	70%	51%	47%
8. Annuity+flat/adj. reference wage	89%	97%	72%	46%	36%
9. Annuity + flat, low density	32%	30%	25%	21%	19%
Female/male replacement rates					
10. Annuity only	32%	36%	58%	49%	52%
11. Annuity + flat	57%	59%	76%	57%	57%
12. Full career woman at 65	118%	128%	160%	100%	93%
13. Annuity+flat/adj. ref. wage	115%	141%	147%	84%	69%
14. Annuity + flat, low density	76%	76%	91%	66%	62%

Source: Calculations by authors

Notes: Replacement rates are defined as pension/reference wage. Reference wage is defined as average wage at ages 51-55. Wage is from Table 5.4, indexed up by 2% wage growth to get wage young worker entering labor force today will receive when he is 51-55. Annuity is from Table 5.6 and flat is from Table 5.7. Man is assumed to retire at 65. Replacement rates are given for “average woman” who retires at 60, except for rows with full career woman who retires at 65. But replacement rates are measured as of age 70, when the reduced flat benefit begins. Low-density means worker contributes only 60% of time he or she works. This affects size of annuity and eligibility for full flat. For rows 3, 8 and 13, with adjusted reference wage: wage rate from Table 5.4 is adjusted by percentage of time individual worked at ages 51-55, to obtain a measure of actual earnings (monthly wage rate*% time worked).

Table 5.9: The impact of joint annuities and unisex tables in Argentina¹

(Based on 5% return during accumulation stage, 3.5% during annuity stage, real wage growth = 2%; 1996 data in 2002 \$'s)

Education	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree
Males, retiring at 65					
1. Individual-gender specific	\$194	\$296	\$443	\$459	\$889
2. Individual—unisex	177	269	404	418	810
3. Joint--gender specific²	153	233	349	362	701
4. Joint—unisex	151	230	344	357	692
Females, retiring at 60					
5. Individual--gender specific	\$34	\$48	\$96	\$134	\$261
6. Individual--unisex	36	52	102	143	280
7. Joint—gender-specific²	32	46	91	127	248
8. Joint--unisex	33	47	93	131	256
7. Widow's jt. ann.	107	163	244	253	491
8. Total widow's pensions	247	317	443	488	869
9. Total widow's pensions as % of total H+W pensions³	78%	77%	78%	79%	79%

Source: calculations by authors

Notes:

1. The flat benefit is not included in annuity calculations, rows 1-8. It is included in rows 8 and 9. Joint annuity assumes 70% to survivor.
2. Corresponds to own-pensions in Table 5.6.
3. Numerator includes own-annuity of wife + wife's flat benefit + widow's flat benefit (i.e. 70% of husband's flat benefit) + widow's joint annuity. Denominator includes (own-annuity + flat) of husband + (own-annuity + flat) of wife while husband was alive. (Wife's flat benefit begins at age 70, except for top educational category where women receive full flat at 60).

Table 5.10: Expected present value of gross lifetime benefits from own-annuities, joint annuity and public benefits in Argentina¹ (1996 data in 2002 US\$000)
(5% return during accumulation, 3.5% during annuity stage, real wage growth = 2%)

	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree +
Average married man					
1. Individual annuity	\$27.7	\$42.2	\$63.2	\$65.5	\$126.9
2. Flat benefit	11.0	11.0	11.0	11.0	11.0
3. Widow's flat	0.6	0.6	0.6	0.6	0.6
4. Joint pd. for wife	-5.8	-8.9	-13.3	-13.8	-26.7
5. Joint annuity received	0.4	0.5	1.0	1.4	2.8
6. Total—married man	\$33.8	\$45.4	\$62.5	\$64.8	\$114.6
7. % increase from flat	40%	26%	17%	17%	9%
8. % decr. from joint pd.	-21%	-21%	-21%	-21%	-21%
Average woman					
9. Own-annuity	\$7.7	\$11.0	\$21.9	\$30.5	\$59.7
10. Flat benefit	6.1	6.1	6.1	6.1	17.6
11. Widow's flat	3.3	3.3	3.3	3.3	3.3
12. Joint pd. for husband	-0.4	-0.6	-1.1	-1.6	-3.1
13. Joint annuity received	6.5	9.9	14.8	15.3	29.6
14. Total-av. marr. woman	\$23.1	\$29.7	\$44.8	\$53.6	\$107.1
15. % increase from flat	79%	55%	28%	20%	29%
16. % incr. widow's flat	42%	29%	15%	11%	5%
17. % incr. from joint rec'd	84%	89%	68%	50%	50%
18. % decr. from joint pd.	-5%	-5%	-5%	-5%	-5%
Full career woman					
19. Own-annuity	\$18.2	\$25.1	\$40.9	\$42.8	\$74.4
20. Joint pd for husband	-1.1	-1.5	-2.5	-2.6	-4.6
21. Flat benefit	13.0	13.0	13.0	13.0	13.0
22. Total-FC marr. woman	\$39.8	\$49.7	\$69.4	\$71.7	\$115.7
23. % increase from flat	71%	52%	32%	30%	17%
24. % incr. widow's flat	18%	13%	8%	8%	4%
25. % incr. from joint rec'd	36%	39%	36%	36%	40%
10 year woman					
26. Own-annuity	\$5.3	\$8.0	\$10.2	\$12.5	\$21.0
27. Joint for husband	-0.3	-0.4	-0.5	-0.7	-1.1
28. Flat benefit	6.1	6.1	6.1	6.1	6.1
29. Total-10yr marr. woman	\$20.9	\$26.7	\$33.8	\$36.5	\$ 58.9
30. % increase from flat	120%	81%	63%	51%	31%
31. % incr. widow's flat	64%	43%	34%	28%	16%
32. % incr. from jt. annuity	128%	131%	153%	130%	149%
Gender ratios					
33. Av. woman/m. man	68%	65%	72%	83%	93%
34. FC woman/m. man	118%	109%	111%	111%	101%
35. 10 yr woman/m. man	62%	59%	54%	56%	51%

Source: calculations by authors

Notes: EPV is given for men and women at age 65. 3.5% rate is used to discount or compound all benefits to age 65. Husbands and wives are assumed to belong to the same educational group. Absolute amount of joint annuity benefit and widow's flat benefit are same for average, full career and 10 year woman. Joint benefit for husband assumes he is married to average woman. % increase is based on individual annuity without flat, in denominator. See notes to Table 4.10.

Table 5.11: Female/male ratios of expected PV of lifetime benefits in new vs. old systems in Argentina

Education	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree +
Old system					
1. Average woman, own-pension	21%	13%	33%	55%	60%
2. Average woman, own-pension+ widow's benefit	40%	30%	47%	64%	68%
3. Full career woman, own-pension	76%	50%	48%	68%	62%
4. Full career woman, own + widow's benefit	80%	57%	55%	69%	65%
5. 10 year woman, own-pension + widow's benefit	40%	30%	27%	31%	30%
New system (average woman/average man)					
6. Own-annuity	33%	31%	42%	56%	57%
7. Own-annuity + flat benefit	41%	37%	44%	56%	67%
8. Own-annuity+ flat+joint annuity + widow's flat	68%	65%	72%	83%	93%
New system (full career woman/average man)					
9. Own-annuity + flat benefit	92%	82%	84%	85%	75%
10. Own-annuity+ flat+joint annuity + widow's flat	118%	109%	111%	111%	101%
New system (ten-year woman/average man)					
11. Own-annuity+ flat+joint annuity + widow's flat	62%	59%	54%	56%	51%

Source: calculations by authors

Notes: Denominator is married man. In old system single and married men got same pension. In new system married man gets smaller pension than single man because he must purchase joint pension. Present values are measured at age 65 for both genders, compounded up to 65 for widow's benefits that potentially start for women at 62.

Table 5.12: Ratios of Expected PV's of Post-Reform/Pre-reform Lifetime Benefits (relative to ratio for married men in top educational group) in Argentina
(r = 5% during accumulation, 3.5% during annuity stage, real wage growth = 2%)

Education*	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree +
Average Man					
1. Married Man—own-annuity+flat	188%	130%	94%	111%	100%
2. Single Man--own-annuity+flat	219%	154%	112%	132%	121%
Women					
3. Average—own-annuity + flat	373%	366%	128%	114%	112%
4. Average married—own-annuity + flat +joint pension+widow's flat	325%	281%	144%	143%	137%
5. Full career—own-annuity+ flat	228%	216%	167%	140%	123%
6. Full career married—own-annuity +flat + joint pension+widow's flat	278%	251%	188%	178%	155%
7. Ten-year married—own-annuity + flat +joint pension+widow's flat	294%	252%	186%	204%	173%
8.Men + women:Average household	227%	167%	110%	123%	115%

Source: Calculations by authors

Notes: Includes lifetime benefits from own-annuity, public benefit and joint annuity (for married). Married includes own flat+widow's flat+joint annuity. Each cell i shows $(PV_{new}/PV_{old})_i / (PV_{new}/PV_{old})_k$ where $(PV_{new}/PV_{old})_i$ = ratio of present value of lifetime benefits in new vs. old systems for group i. This is normalized by the ratio for reference group k, where k=married men in highest educational category. If the number in a cell > 100%, this means it gained more than top married men.

Table 6.1—Main features of Old and New Systems in Mexico

	Old System	New System
Structure	PAYG defined benefit	Private pillar: Funded individual accounts Public pillar: Social quota (SQ) + minimum pension guarantee (MPG)
Contribution rate	8.5% (incl. .425% from govt.) + 2% (SAR, 1992)	6.5% (incl. .225% from govt.) + 5.5% of minimum wage from govt (SQ); SQ + MPG financed from general revenues ¹
Benefits	Defined benefit: 80-100% of base salary (formula on separate page)	Private pillar: pension from account Public pillar: pension from SQ; also MPG
Base salary	Average of last 250 working weeks	Not relevant
Pensionable age	65	65 for men and women
Years for eligibility	500 weeks	24 years for MPG; no minimum for account pension
Pension if worked fewer yrs	0	Pension from account
Indexation provisions	No automatic indexation	Annuity, SQ and MPG are price-indexed ²
Minimum pension	1 minimum wage after 10 years of contributions ²	1 minimum wage after 25 years of contributions ²
Widows	90 % of husband's pension + own pension	60% of husband's pension (joint annuity) + own annuity

Notes:

1. The social quota started at 2.2% of the average wage. It is indexed to prices so will fall as % of average wage as productivity grows. Contribution rate given includes an administrative charge that was about 1.9% of wage initially, now is 1.5% of wage. In addition, about 2.5% of payroll is charged for disability and survivors insurance.
2. Under the old system the minimum pension = minimum wage. Linkage of minimum wage to price or wage growth wage was ad hoc. Under new system, SQ and MPG are formally linked to CPI. Mexico also plans for private annuity to be price-indexed but feasibility and cost remain to be determined.

Table 6.2: Old system formula in Mexico

The annual retirement pension is based on:

- a) base amount given by a percentage of the income earned during the last 5 years of contribution,
- b) an increase for each additional year contributed, and
- c) the number of years of contribution in excess of the minimum 10 year requirement.

The value of the annual pension is calculated according to the following expression:

$$\text{Annual pension} = S * [(Base\%)+(Y)* (AI)]$$

Where:

S= base salary used for the last 5 years of contribution
 Base%= percentage of base salary in base amount
 Y= additional years contributed beyond 10 years

AI= annual increment as % of S, for each additional year beyond 10 years.

In addition, the IMSS provides retirees with a yearly bonus equivalent to one month of the pension payment they were receiving. Thus the total annual amount received would be 13/12 of the value obtained by the above expression.

Base% and AI are rates determined in a table (IMSS, 1993), which vary according to the amount S expressed in number of minimum wages. The Base% is inversely related to S, and ranges from 80% to 13%. The annual increment, AI, is directly related to S, and ranges from 0.563% to 2.45%.

Below we provide an example of the calculation for levels S of 1 and 6 minimum wages, assuming a total of 30 years of contribution to IMSS.

S	Base%	AI	Y	Estimated annual pension
1 minimum wage	80%	0.56%	20	13/12* S * (96.9%) =105%
6 minimum wages	13%	2.45%	20	13/12* S * (86.5%) =93.7%

Thus, replacement rates of base salary range between 94% and 105% for high and low wage worker, respectively, who has worked for 40 years. For 10 years of work these replacement rates would be 14% and 87%, respectively.

Table 6.3: Estimated Years of Work by Age, Education and Gender in Mexico¹

	Schooling				
Age:	0-5	6-8	9	10-12	13+
Men					
16-20	4.38	4.29	4.17	3.51	2.96
21-25	4.62	4.78	4.78	4.47	3.80
26-30	4.85	4.95	4.90	4.95	4.72
31-35	4.89	4.88	4.93	4.90	4.95
36-40	4.89	4.87	4.93	4.88	4.87
41-45	4.82	4.88	4.86	4.85	4.91
46-50	4.71	4.63	4.68	4.78	4.80
51-55	4.48	4.41	4.39	4.46	4.49
56-60	4.10	3.84	3.85	4.04	4.24
61-65	3.26	2.79	3.06	3.04	3.06
Total 16-65:	45.00	44.33	44.55	43.89	42.83
Density of work²	90%	89%	89%	88%	86%
Women					
16-20	3.44	3.99	3.89	3.64	3.23
21-25	1.55	1.50	2.55	3.72	3.85
26-30	1.90	1.70	1.90	2.30	3.65
31-35	2.57	2.02	2.10	2.42	3.40
36-40	2.30	2.23	2.42	2.73	3.26
41-45	2.34	2.24	2.60	2.59	3.49
46-50	2.07	2.05	2.05	2.54	3.41
51-55	2.11	1.65	1.81	1.75	2.81
56-60	1.57	1.39	1.74	1.65	2.32
61-65	1.08	1.17	0.79	1.00	2.29
Total 16- 65:	20.93	19.92	21.90	24.36	31.71
Density of work²	42%	40%	44%	49%	63%

Source: Calculations by authors based on data from ENE97

Notes:

1 Based on data from “more urban” areas defined as communities with 100,000 people or more. For data sources and methodology see Appendix.

2 Density of work = total working years to normal retirement age/total possible contributing years from age 16 to normal retirement age of 65. We define “low density worker” as one who contributes 60% of time that he works.

Table 6.4 Estimated Average Monthly Wage by Age, Education and Gender in Mexico

(more urban areas, 1997 data in 2002 US\$'s)¹

Males

Age	Schooling				
	0-5	6-8	9	10-12	13+
16 – 20	157	165	174	179	204
21 – 30	217	234	267	330	494
31 - 40	246	284	324	426	810
41 - 50	265	306	412	486	974
51 - 60	243	344	422	552	1027
61 - 65	219	309	520	910	1206

Females

Age					
16 – 20	131	157	163	194	198
21 – 30	154	168	201	287	414
31 - 40	151	180	235	358	563
41 - 50	146	230	281	393	641
51 - 60	157	209	247	469	687
61 - 65	123	146	260 ²	418 ²	1049 ²

Source: Calculations by authors based on data in ENE97

Notes:

1 Estimates are for average monthly wages received by persons employed for pay full time plus part time in more urban areas in 1997. For more details on data and methodology see Appendix.

2 Average in the cell obtained from fewer than 30 observations; numbers should be used with caution.

Table 6.5: Gender differences in fund accumulation in Mexico: Decomposition of male/female differences (in 2002 US\$000's)

(based on 5% real rate of return, 2% real wage growth)

A. From own-contributions; does not include annuity from SQ

Schooling	0-5	6-8	9	10-12	13+
Accumulated funds at retirement (age 65 for men and women)					
1. Woman with 10 years contributions	\$8.2	\$9.0	\$10.7	\$15.1	\$21.8
2. Average woman	13.6	16.2	21.5	34.8	71.1
3. Full career woman	28.3	35.2	43.1	63.3	97.5
4. Average man	46.2	53.7	66.1	83.3	142.5
5. Low density man	27.7	32.2	39.7	50.0	85.5
6. Low density woman	8.2	9.7	12.9	20.9	42.7
Fund ratios of women relative to men (percentages)					
7. Woman with 10 years contributions	18%	17%	16%	18%	15%
8. Average woman	30%	31%	33%	43%	51%
9. Full career woman	61%	65%	65%	76%	68%
10. Average men	100%	100%	100%	100%	100%
11. Low density woman/ low density man	30%	31%	33%	43%	51%

B. From own-contributions plus SQ

Accumulated funds at retirement (age 65 for men and women)					
1. Woman with 10 years contributions	\$14.3	\$15.0	\$16.7	\$21.2	\$27.9
2. Average woman	22.1	24.7	31.0	45.4	83.4
3. Full career woman	45.0	51.9	59.8	79.3	112.4
4. Average man	63.0	70.5	82.8	99.2	157.5
5. Low density man	37.8	42.3	49.7	59.5	94.5
6. Low density woman	13.3	14.8	18.6	27.2	50.1
Fund ratios of women relative to men (percentages)					
7. Woman with 10 years contributions	23%	21%	20%	21%	18%
8. Average woman	35%	35%	37%	46%	53%
9. Full career woman	71%	74%	72%	80%	71%
10. average men	35%	35%	37%	46%	53%
11. Low density woman/ low density man	23%	21%	20%	21%	18%

Source: calculations by authors

Note: This table gives projected fund accumulations at retirement for young worker entering labor force today. It is assumed that women with 10 years of contributions work from age 21 to age 30 and full career women work with the same intensity as men but earn the same wages as other women. Low-density means workers contribute 60% of working time.

Table 6.6: Estimated Monthly Annuities from Individual Accounts in Mexico¹
 (Based on 5% real return in accumulation stage, 3.5% in annuity stage, 2% real wage growth, 1997 data using 2002 US\$'s, retirement age = 65 for men and women)

	0-5	6-8	9	10-12	13+
Average married males, monthly annuity (US\$'s)					
1. Average man	\$267	\$ 310	\$381	\$481	\$822
2. Low density man	160	186	229	289	493
Females, monthly annuity (US\$S)					
3. Average woman	\$78	\$93	\$123	\$199	\$407
4. Full career woman	162	201	247	362	558
5. 10-year woman	47	51	61	86	125
6. Low density woman	47	55	74	120	244
Female/male ratios (percentages)					
7. Average woman	29%	30%	32%	41%	49%
8. Full career woman	61%	65%	65%	75%	68%
9. 10-year woman	18%	17%	16%	18%	15%
10. Low density woman/ low density man	29%	30%	32%	41%	49%

Source: calculations by authors

Notes: This table gives projected annuity at retirement for young worker entering labor force today. For notes see Appendix. Annuity is based on own-contribution; portion from SQ is not included in this table. Men and women are assumed to purchase joint annuity with 60% to survivor, as required for married couples. Gender-specific tables are used. Low-density means worker contributes 60% of working time he or she works.

Table 6.7: Impact of public benefit on gender ratios of monthly pensions, Mexico
(based on: 5% real return in accumulation stage, 3.5% in annuity stage, 2% real wage growth; 1997 data in 2002 US\$'s, retirement age 65 for men and women)

Education	0-5	6-8	9	10-12	13+
Married men					
1. Own-annuity, no SQ	\$267	\$310	\$381	\$481	\$822
2. Annuity incl. SQ	\$364	\$407	\$478	\$573	\$909
3. % increase by SQ	36%	31%	25%	19%	11%
4. Low density incl. SQ	\$218	\$244	\$287	\$344	\$545
Women					
5. Own-annuity, no SQ	\$78	\$93	\$123	\$199	\$407
6. Annuity including SQ	126	141	177	260	477
7. % increase by SQ	62%	52%	44%	30%	17%
8. Full career woman--annuity including SQ	258	297	342	454	643
9. % increase by SQ--full career woman	59%	48%	39%	25%	15%
10.10 year woman—annuity including SQ	82	86	96	121	160
11. % increase by SQ—10-year woman	74%	67%	56%	41%	28%
12.Low density woman—annuity including SQ	76	85	106	156	286
Female/male ratios (percentages)					
13.Av.-annuity, no SQ	29%	30%	32%	41%	49%
14.Av.-annuity incl. SQ	35%	35%	37%	45%	53%
15.FC-annuity incl. SQ	71%	73%	72%	79%	71%
16. 10-year, incl. SQ	22%	21%	20%	21%	18%
17.Low density F/ low density M, incl. SQ	35%	35%	37%	45%	53%

Source: Calculations by authors

Note: This table gives projected pensions at retirement for young worker entering labor force today. The public benefit takes the form of the social quota (SQ), a uniform payment per day worked into the account of each worker. The SQ was set equal to 5.5% of the minimum wage initially, and thereafter was indexed to prices. Mexico also has an MPG = \$133 in 2002 US\$, but this is exceeded in practically every educational category after the SQ is added, except for ten-year women and low density women, who are not eligible for the MPG.

Table 6.8: Replacement rates in Mexico (pension/reference wage)

	0-5	6-8	9	10-12	13+
Replacement rates for average married male					
1. Annuity only	57%	47%	47%	45%	42%
2. Annuity + SQ	78%	62%	59%	54%	46%
3. Annuity+SQ/adjusted reference wage	87%	70%	67%	60%	51%
4. Annuity+SQ, low density man	47%	37%	35%	32%	28%
Replacement rates for females					
5. Annuity only	26%	23%	26%	22%	31%
6. Annuity + SQ	42%	35%	37%	29%	36%
7. Annuity + SQ, full career woman	85%	74%	72%	50%	49%
8. Annuity+SQ/adjusted reference wage	99%	106%	103%	82%	64%
9. Annuity + SQ, low density woman	25%	21%	22%	17%	22%
Female/male replacement rates					
10. Annuity only	45%	49%	55%	49%	74%
11. Annuity + SQ	54%	57%	63%	53%	78%
12. Full career woman	110%	120%	122%	93%	106%
13. Annuity+SQ/adjusted reference wage	114%	152%	154%	136%	125%
14. Annuity + SQ, low density	54%	57%	63%	53%	78%

Source: calculations by authors

Notes: Replacement rates are defined as pension/reference wage. Reference wage is defined as monthly wage rate at ages 51-60. Wage is from Table 6.4, indexed up by 2% wage growth. Annuity + SQ are from Tables 6.6 and 6.7. Men and women are assumed to retire at 65. Low-density means worker contributes only 60% of time he or she works. For rows 3, 8 and 13 with adjusted wage: wage rate from Table 6.4 is adjusted by percentage of time individual worked at ages 51-55, to obtain a measure of actual earnings (monthly wage rate*% time worked).

Table 6.9: The impact of joint annuities and unisex tables in Mexico¹

(based 5% return during accumulation stage, 3.5% during annuity stage, real wage growth= 2%; 1997 data in 2002\$'s)

Education	0-5	6-8	9	10-12	13+
Males					
1. Individual--gender specific	\$448	\$501	\$589	\$705	\$1,120
2. Individual—unisex	409	457	537	643	1021
3. Joint—gender specific²	364	407	478	573	909
4. Joint—unisex	355	397	467	559	888
Females					
5. Individual--gender specific	\$133	\$148	\$187	\$273	\$502
6. Individual--unisex	143	160	201	294	541
7. Joint—gender specific²	126	141	177	260	477
8. Joint—unisex	131	146	184	269	494
9. Widow's annuity	218	244	287	344	545
10. Widow's+own-annuity	345	385	464	603	1023
11. Widow's pensions as % of H+W pensions³	70%	70%	71%	72%	74%

Source: calculations by authors

Notes:

1. The SQ is included in annuity calculations. Joint annuity assumes 60% to survivor.
2. These numbers are from Table 6.7.
3. Own-annuity of wife + widow's annuity after husband dies relative to own-annuities of husband + wife while husband was alive.

Table 6.10 Expected present value of gross lifetime benefits from own-annuities, joint annuity and public benefits in Mexico¹ (1997 data in 2002 US\$000)

(Based on 5% return during accumulation stage, 3.5% discount rate, real wage growth = 2%)

Education	0-5	6-8	9	10-12	13+
Average man					
1. Individual annuity-no SQ	\$46.2	\$53.7	\$66.1	\$83.3	\$142.5
2. SQ to own-account	16.8	16.8	16.7	16.0	15.0
3. Joint annuity pd. for wife	-11.9	-13.3	-15.6	-18.7	-29.7
4. Joint annuity rec'd	1.0	1.1	1.4	2.0	3.8
5. Total-av. married man	52.1	58.3	68.6	82.6	131.6
6. % increase from SQ	36%	31%	25%	19%	11%
7. % incr. from joint rec'd	2%	2%	2%	2%	3%
8. % decr. from joint paid	-19%	-19%	-19%	-19%	-19%
Average woman					
9. Own annuity if no SQ	\$13.6	\$16.2	\$21.5	\$34.8	\$71.1
10. SQ to own-account	8.5	8.5	9.5	10.6	12.3
11. Joint annuity rec'd	13.2	14.7	17.3	20.7	32.9
12. joint annuity pd	-1.1	-1.2	-1.6	-2.3	-4.2
13. Total—married woman	34.2	38.1	46.8	63.8	112.2
14. % incr. from SQ	62%	52%	44%	30%	17%
15. % incr. from jt. annuity	97%	91%	80%	60%	46%
16. % decr. from joint pd.	-5%	-5%	-5%	-5%	-5%
Full career woman					
17. Own annuity if no SQ	\$28.3	\$35.2	\$43.1	\$63.3	\$97.5
18. SQ to own-account	16.8	16.8	16.7	16.0	15.0
19. Total-FC m. woman	55.9	64.1	74.1	96.1	139.7
20. % incr. from SQ	59%	48%	39%	25%	15%
21. % incr. from jt. annuity	46%	42%	40%	33%	34%
10 year woman					
22. Own annuity if no SQ	\$8.2	\$9	\$10.7	\$15.1	\$21.8
23. SQ to own-account	6.1	6.0	6.0	6.1	6.1
24. total-10-yr. m. woman	26.7	29.0	33.2	40.9	59.4
25. % incr. from SQ	74%	67%	56%	41%	28%
26. % incr. from jt. annuity	160%	164%	162%	137%	151%
Married women/married men ratios					
27. Average woman	66%	65%	68%	77%	85%
28. FC woman	107%	110%	108%	116%	106%
29. 10-year woman	51%	50%	48%	50%	45%

Source: Simulations by authors.

Notes: EPV is given for men and women at age 65. Husbands and wives are assumed to belong to the same educational group. Absolute amount of joint annuity is same for average, full career and 10 year woman but it varies as % of own annuity. % increase due to SQ and joint annuity received are based on individual annuity without SQ, in denominator. % decrease due to joint annuity purchased has individual annuity + SQ in denominator, since part of purchase is attributable to SQ. (Also see notes to Table 4.10)

Table 6.11: Female/male ratios of expected PV of lifetime benefits in new vs. old systems in Mexico

Education	0-5	6-8	9	10-12	13+
Old system					
1. Average woman, own-pension	39%	33%	29%	33%	59%
2. Average woman, own-pension + widow's benefit	77%	71%	68%	72%	97%
3. Full career woman, own-pension	70%	60%	63%	73%	91%
4. Full career woman, own-pension + widow's benefit	108%	99%	102%	112%	130%
5. 10-year woman, own-pension + widow's benefit	69%	57%	52%	46%	44%
New system (average woman/average man)					
6. Own-annuity, no SQ	26%	28%	31%	42%	54%
7. Own-annuity including SQ	42%	42%	45%	55%	63%
8. Own-annuity including SQ + joint annuity	66%	65%	68%	77%	85%
New system (full career woman/average man)					
9. Own-annuity including SQ	86%	89%	87%	96%	85%
10. Own-annuity including SQ+joint annuity	107%	110%	108%	116%	106%
New system (ten-year woman/average man)					
11. Own-annuity including SQ +joint annuity	51%	50%	48%	50%	45%

Source: calculations by authors

Notes: Denominator is married man. In old system single and married men got same pension. In new system married man gets smaller pension than married man because he must purchase joint pension. Present values are measured at age 65 for both genders.

Table 6.12: Ratios of Expected PV's of Post-Reform/Pre-reform Lifetime Benefits in Mexico (relative to ratio for married men in top educational group)

(r = 5% during accumulation, 3.5% during annuity stage, real wage growth = 2%)

Education*	0-5	6-8	9	10-12	13+
Average Man					
1. Married Man—own-annuity incl. SQ	181%	150%	122%	89%	100%
2. Single Man—own-annuity including SQ	219%	181%	147%	107%	120%
Women					
3. Average—own-annuity including SQ	199%	195%	187%	146%	108%
4. Average married—own-annuity including SQ + joint annuity	154%	138%	122%	96%	88%
5. Full career—annuity including SQ	225%	221%	169%	116%	94%
6. Full career married—own-annuity including SQ + joint annuity	180%	166%	130%	92%	82%
7. Ten year married-- own-annuity including SQ + joint annuity	134%	130%	114%	95%	103%
8. Men + women: Average household	169%	145%	122%	92%	94%

Source: calculations by authors

Notes: Includes lifetime benefits from own-annuity, public pillar and joint annuity (for married). Each cell i shows $(PV_{new}/PV_{old})_i / (PV_{new}/PV_{old})_k$ where $(PV_{new}/PV_{old})_i$ = ratio of present value of lifetime benefits in new vs. old systems for group i. This is normalized by the ratio for reference group k, where k=married men in highest educational category. If the number in a cell >100%, this means it gained more than top married men.

Table 7.1: Labor Market Patterns of Women and Men in Transitional Economies¹

	Kazakhstan		Latvia		Poland	
	F	M	F	M	F	M
Formal labor force participation rates—F/M ratios	85%		85%		78%	
Average years of work at retirement.	35	40	32	39	32	42
Wage ratio (F/M)	72%		80%		80%	
Retirement age	58	63	60	60	60	65
Life expectancy at retirement	25	13	21	15	24	15
Unisex life exp'cy at retirement	19	16	17	17	20	16

1. Years vary between 1996 and 1999. Sources: Castel and Fox (2001), Woycicka (2002) and additional data supplied by Castel. Life expectancy at retirement is from Whitehouse 2003.

Table 7.2: Female/male ratios in pensions¹

	Kazakhstan		Latvia		Poland
	New	Old	New	Old	New
Projected gender ratios in pensions (F/M)	52%	95-100%	62%	98%	45% (no unisex) 57% (unisex) 73% (unisex, equal RA) 81% (old DB formula, new work patterns)

Sources: For Kazakhstan and Latvia, see Castel and Fox (2001). For Poland see Woycicka (2002). Additional data provided in personal communications with Castel and Chlon-Dominczak.

Notes:

1. Methodologies are quite different from those used for Latin America study. These simulations are based on data for average man and woman presented in Table 7.1. They do not use age-specific wage rates and labor force participations rates, and were not disaggregated by educational level or marital status. For Kazakhstan and Latvia, rate of return in funded pillar was assumed to be 3 percentage points higher than rate of wage growth. For Poland interest rate and rate of wage growth were assumed to be approximately equal. This holds for notional defined contribution public pillar but it underestimates rate of return in the private pillar. Higher rate of return would increase absolute pensions and replacement rates but leave gender gap for average woman unchanged. Unisex mortality tables are assumed for NDC pillars in Poland and Latvia; also for funded pillars in Kazakhstan and Latvia, although this has not yet been decided by policy-makers. For Poland results are given both for unisex and gender-specific mortality tables, assuming earlier retirement age for women. Third line for Poland gives results if unisex tables are used, retirement age for women is raised to 65 (equalized to that of men) and women work an additional 4 years. Fourth line gives results of old system formula, new wage and work behaviors. The minimum pension was not included, but this will not affect average woman.

Table 7.3: Female/male ratios of monthly annuities, lifetime benefit/contribution rates and replacement rates in new Swedish system

Education	No upper secondary	Upper secondary	Undergrad < 2 yrs	Undergrad > 2 yrs	Postgrad ed.
A. Monthly annuities					
Full career woman	0.88	0.83	0.88	0.91	0.99
Full/part-time	0.82	0.79	0.84	0.84	NA
10-year woman	0.41	0.40	0.35	0.35	0.40
Part-time woman	0.66	0.62	0.66	0.67	NA
B. Lifetime annuities					
Full career woman	1.00	0.94	1.00	1.03	1.03
Full/part-time	0.93	0.90	0.95	0.95	NA
10-year woman	0.47	0.45	0.40	0.40	0.45
Part-time woman	0.75	0.70	0.75	0.76	NA
C. Lifetime Benefit/Contribution Ratios					
Full career woman	1.16	1.15	1.21	1.28	1.28
Full/part-time	1.18	1.17	1.23	1.23	NA
10-year woman	3.69	3.22	3.65	3.92	3.07
Part-time woman	1.19	1.19	1.25	1.32	NA
D. Replacement rates--with unisex tables and child credits					
Full career woman	1.02	1.12	1.00	1.22	1.21
Full/part-time	.98	1.07	.96	1.17	NA
10-year woman	1.45	1.31	1.22	1.42	1.43
Part-time woman	1.04	1.17	1.04	1.25	NA
E. Replacement rates--with gender-specific tables and child credits					
Full career woman	0.89	0.97	0.90	1.03	1.04
Full/part-time	0.86	0.95	0.85	1.00	NA
Part-time woman	0.98	0.97	0.90	1.03	NA
F. Replacement rates--with unisex tables, no child credits					
Full career woman	1.02	1.12	1.00	1.22	1.21
Full/part-time	0.94	1.05	0.93	1.14	NA
Part-time woman	1.00	1.12	1.00	1.22	NA

Source: Stahlberg et al 2006 a and b

Notes: Replacement rate is pension/final wage. Benefit/contribution rate is calculated in present value terms at age 65. Replacement rate and benefit/contribution rate include own annuities + minimum pension guarantee. Denominator is average full time man with same education as women for all gender ratios.

Table 7.4: Female/Male Ratios of Annuities, Lifetime Benefit/contribution Rates and Replacement Rates in Old Swedish System

	No upper secondary	Upper secondary	Undergrad < 2 yrs	Undergrad > 2 yrs	Postgrad ed.
Annual annuities					
Full career woman	0.96	0.98	1.00	1.00	1.00
Full/part-time	0.94	0.98	1.00	1.00	NA
10-year woman	0.35	0.37	0.35	0.34	0.42
Part-time woman	0.72	0.75	0.93	0.94	NA
Lifetime annuities					
Full career woman	1.10	1.11	1.14	1.14	1.14
Full/part-time	1.07	1.11	1.14	1.14	NA
10-year woman	0.40	0.42	0.40	0.39	0.48
Part-time woman	0.82	0.85	1.05	1.07	NA
Lifetime Benefit/Contribution Ratios					
Full career woman	1.27	1.41	1.43	1.54	1.54
Full/part-time	1.31	1.44	1.47	1.47	NA
10-year woman	11.51	10.79	13.72	14.81	13.35
Part-time woman	1.31	1.49	1.83	2.04	NA
Replacement rates					
Full career woman	1.12	1.33	1.13	1.32	1.21
Full/part-time	1.14	1.33	1.16	1.39	NA
10-year woman	1.24	1.20	1.24	1.35	1.54
Part-time woman	1.16	1.33	1.16	1.39	NA

Source: Stahlberg et al 2006a and b

Notes: Replacement rate is pension/final wage. Benefit/contribution rate is calculated in present value terms at age 65. Replacement rate and benefit/contribution rate include own annuities + minimum pension guarantee. Denominator is average full time man with same education as women for all gender ratios.

Table 7.5 Balances in Retirement Savings Accounts, 2002 (in 000 Australian dollars)

Age group	Full time workers	Part time workers	Not in labor force		Low income	High income		Av. for those with accounts
Men								
15-24	8	1	.3		.5	8		7
25-34	29	15	6		9	39		27
35-44	70	24	9		14	93		65
45-54	122	67	43		35	165		122
55-64	166	160	85		56	252		184
Total	72	39	42		17	123		79
Women								
15-24	7	1	.5		.6	7		4
25-34	27	14	8		8	50		21
35-44	54	24	13		10	82		38
45-54	83	44	20		18	156		68
55-64	77	58	42		23	127		95
Total	47	24	17		9	100		43
Women/Men								
15-24	.88	1.00	1.67		1.20	.88		.57
25-34	.93	.93	1.33		.89	1.28		.78
35-44	.77	1.00	1.44		.71	.88		.58
45-54	.68	.66	.47		.51	.95		.56
55-64	.46	.36	.49		.41	.50		.52
Total	.66	.62	.40		.55	.82		.55

Source: Clare 2004 based on Household, Income and Labour Dynamics in Australia (HILDA) Survey, 2002

Notes: Low income means gross income <\$15,000 in last financial year

High income means gross income >\$50,000 in last financial years

(Medium income group is omitted)

Average gender ratio would be less than 50% if women without accounts were included.

In 2002 the exchange rate varied between US\$.51-.56 = A\$1.00

Table 7.6: Stylized Pensions from Public and Private Benefits by Gender, Education and Marital Status in Australian-type System (expressed as % of average male wage)

Educational category	Low	Middle	High
Benefits for av. married man			
-private pension	25	50	100
-public benefit	20	13	0
-total pension	45	63	100
% increment by public benefit	80%	26%	0
Benefits for av. married woman			
-private pension	15	30	60
-public benefit	20	13	0
-total	35	43	60
% increment by public benefit	133%	43%	0
Benefits for av. single man			
-private pension	25	50	100
-public benefit	25	17	0
-total pension	50	67	100
% increment by public benefit	100%	34%	0
Benefits for widow, single woman			
-private pension	15	30	60
-public benefit	25	23	13
-total	40	53	73
% increment by public benefit	167%	77%	22%
Benefits for FC single woman			
-private pension	22	44	88
-public benefit	25	19	4
-total	47	63	92
% increment by public benefit	114%	43%	5%
Gender ratios (F/M)			
-private pensions	.60	.60	.60
-priv+pub pension, av. married	.78	.68	.60
-priv+pub pension, av. single	.80	.79	.73

Source: calculations by authors

*These are hypothetical numbers, designed to show impact of an Australian-type means-tested benefit. Assumptions: Men in low, middle and high educational categories earn 50%, 100% and 200% of average male earnings, respectively. Average man gets 50% replacement rate of his wage from private retirement savings account, based on 9% contribution rate. Average women's private pensions are 60% those of average man in same educational category, based on Table 6.5. Full career women work as much as men but earn and accumulate only 88% as much, due to wage differentials. Men and women marry within same educational class. Individual annuitization is assumed. Phase-out rule is \$1 of public benefit lost for every \$3 increment in private pension, beyond \$25 for single individuals, \$40 for married couples.

Table 9.1: Comparing gender indicators (F/M ratios for average man and woman)*

Education	1	2	3	4	5
Chile					
Monthly benefits					
Own annuity	33%	32%	38%	45%	36%
Own annuity + MPG	44%	32%	38%	45%	36%
Own+w-indexed MPG	96%	66%	45%	45%	36%
Lifetime benefits					
Own annuity	64%	50%	59%	70%	56%
Own annuity+MPG	121%	88%	67%	70%	56%
Own + MPG + joint	87%	73%	83%	94%	79%
Replacement rates					
Own+MPG	63%	54%	49%	72%	96%
Own+w-indexed MPG	139%	112%	57%	72%	96%
--ref. wage adjusted	93%	97%	78%	84%	99%
Post/pre-reform--total	136%	128%	97%	89%	105%
Argentina					
Monthly benefits					
Own annuity	21%	20%	26%	35%	35%
Own + flat at 65	14%	15%	21%	29%	42%
Own + flat at 70	37%	32%	34%	41%	42%
Lifetime benefits					
Own annuity	33%	31%	42%	56%	57%
Own annuity+flat	41%	37%	44%	56%	67%
Own+flat+joint+wid.	68%	65%	72%	83%	93%
Replacement rates					
Own annuity + flat	57%	59%	76%	57%	57%
--ref. wage adjusted	115%	141%	147%	84%	69%
Post/pre-reform—total	325%	281%	144%	143%	137%
Mexico					
Monthly benefits					
Own annuity-no SQ	29%	30%	32%	41%	49%
Own annuity incl. SQ	35%	35%	37%	45%	53%
Lifetime benefits					
Own annuity-no SQ	26%	28%	31%	42%	54%
Own annuity incl. SQ	42%	42%	45%	55%	63%
Own incl.SQ + joint	66%	65%	68%	77%	85%
Replacement rate					
Own annuity incl. SQ	54%	57%	63%	53%	78%
--ref. wage adjusted	114%	152%	154%	136%	125%
Post/pre-reform—total	154%	138%	122%	96%	88%

Source: calculations by authors

*This table gives average female/male ratios for each indicator, taken from earlier tables. Monthly ratios are measured at age 65 in Chile and Mexico, 65 and 70 in Argentina.

Appendix on data sources and methodology

The Chile estimates are based on CASEN 94, a nationally representative survey that provides information on current labor force participation, working status, affiliation to social security and contributory status. The estimates used are based on the urban sample—approximately 100,000 individuals age 16 or older. We report contribution patterns among affiliates (workers who have contributed at some point) in urban areas. The self-employed are not required to contribute. Our data indicate that 73% of all male workers and 55% of female workers affiliate (most of the others are self-employed) and 90% of male affiliates (91% of women affiliates) who are employed contribute to social security. Thus, in Chile our estimates are close to the behavior of the average affiliate but do not apply to women who never worked in the formal labor market. Contribution experience is estimated based on current contributions of affiliates in different age and education cells. Wages reflect pay for full time work (most work is full time, or 35 hours per week, in Chile). For some analyses data on the distribution of wages within each cell were used to estimate dispersion of pension accumulations for that cell.

The Argentine data are based on the micro data set of the Encuesta Nacional de Gastos de los Hogares (ENGH) for 1996-97, a nationally representative household survey. The sample contains 103,858 individuals, of whom 69,895 were 16 years or older. All regions covered are considered urban. Our data do not allow us to distinguish between affiliates and non-affiliates or between full timers and part timers. In Argentina all workers, including the self-employed, are supposed to affiliate and contribute. However, from other sources we know that the over-all contribution rate is only 23% of the economically active population, compared with 60% in Chile (AIOS 2005). Thus, many work years may be non-contributing years. Work experience is estimated based on current employment status of the urban population, including both full time and part time workers. Wages reflect pay for full time and part time work, hence understate the true full time wage rate. Because we cannot distinguish between non-affiliates and affiliates, who have a higher labor force participation rate, we probably understate the labor force attachment of affiliates. However, we probably overstate contributions of affiliates when working, because of the high evasion rate.

The Mexican data come from the 1997 Mexican National Employment Survey (ENE-97) completed by INEGI (*Instituto Nacional de Estadística, Geografía e Informática*), the Mexican Statistical Bureau. The sample contains information on 119,405 individuals aged 12 or older. We use the sub-sample corresponding to more-urban areas (communities of 100,000 people or more), which is about 78% of the sample. This survey contained the standard employment survey questions, plus a module with employment history and job training questions. The ENE97 does not allow for the identification of social security affiliates (about 42% of the economically active population) and/or the contributions made to retirement plans. Work experience is estimated based on current employment (both part time and full time) of more-urban population in relevant age-education cells. Wages reflect pay for full time and part time work in each cell. For some analyses we used the observed coefficient of variation on earnings for each cell as an estimate of the distribution of years worked and resulting annuity within that cell.

Using these cross-sectional statistical data, we divided men and women into gender-age-education-marital status cells. A typical cell, for example, might consist of all married women with high school degree age 30-35. For each cell we obtained the average employment rates and wage rates for the current population. Data on marital state enabled us to identify the age, \underline{M} , at which the probability of being married $> 50\%$. In constructing our synthetic men and women, we used the employment probability and wage rate of the single individual up to age \underline{M} , and the married individual after age \underline{M} . The labor force participation rate of women typically declined sharply when they got married. In some (high education older age) cells the number of single women is very small and is not broken down by category (divorced, widow, never-married) so we could not profile women who remained single throughout life. However, to the extent possible we show the ratio of employment of single women to our representative women who marry. It appears that single women work habits are much closer to that of men, than is the case for married women.

We assumed that for each educational level, an average man or woman who enters the labor force today proceeds through life with the age-specific employment probabilities and wage rates that were derived from the cross-sectional data. For

simulations where positive economy-wide wage growth was assumed, we multiplied the age-specific wage rate by the projected growth factor. For all three countries our simulations use three different labor attachment patterns for women: “Full career women” are those who have same labor force participation rates and retire at same age (65) as men. “10-year women” are women who work only 10 years, early in their adult lives, before children are born. “Average women” have average work and wage for each education cell. “Average women if RA=65” are women who start their annuity at age 65 but have same work experience as average women up to age 60. In some cases we simulate outcomes for low-density men and women who contribute only 60% of the time they work or for men who retire early.

Contributions and fund accumulations are based on estimated annual earnings and work experience for each age-education-gender cell. In baseline, real rate of wage growth is 2% annually and rate of return is 5% during accumulation stage, 3.5% during payout stage. For Chile our data give us contributing years by affiliates. For Argentina and Mexico our data do not allow us to identify contributing years by affiliates. Instead, we treat all work years as contributing years, but we also present “low density of contribution” cases, where the worker contributes only 60% of working years. It should be noted that mismeasurement of the density of contributions affects the absolute amount of the pension but does not affect most gender ratios on which we focus, so long as the mismeasurement is in the same proportion for men and women.

Annuity upon retirement is assumed in order to get a stable lifetime income flow. Annuity payouts are obtained by dividing the accumulation by the actuarial factor, which depends on mortality and discount rates. The actuarial factor for individual annuities at age 65 is the expected present value at 65 of a \$1 annual annuity payout, paid from age 65 to the end of life. It is derived by summing the expected present discounted value of the annual \$1 payout, from each age, starting at 65 to some terminal age such as 100, at which point the probability of survival approaches 0.

$$A = \sum_{a=65}^{\infty} s_a \cdot (1+r)^{65-a}, \text{ where}$$

A= actuarial factor

s_a = survival rate, which is the probability the individual has survived to age a

$(1+r)^{65-a}$ discounts the expected payout at age a back to age 65

Summing over all ages to 100 give us the EPV of the \$1 payout, or the premium that will be charged for a \$1 annuity payout. Dividing the accumulation by A then tells us the annual payout that can be purchased with that accumulation. Conversely, multiplying the annual payout by A tells us the expected present value (EPV) of that annuity and the premium that is necessary to purchase it in actuarially fair annuity markets. We derived A for each case discussed, with the help of a Stata program that was developed and shared with us by Edwards Whitehouse of the OECD.

For the survivors benefit in a joint annuity, instead of s we use $s^w*(1-s^h)$ for each time period—the probability the husband will be dead and the wife still alive, in each time period. The actuarial factor for the joint annuity is then the sum of two parts: the husband's benefit and the benefit for the surviving widow.

For the discount rate we use 3.5%, somewhat less than the 5% assumed during the accumulation stage because we assume that individuals purchase guaranteed fixed annuities which require insurance companies to invest in a relatively conservative fashion. We use the World Bank mortality tables for the cohort retiring in 2040, which is approximately when today's young workers will retire. These tables incorporate projected mortality improvements for older people that are expected (with uncertainty) to occur over the next 35 years. Today's tables would have higher mortality rates, so would yield larger annuities for a given accumulation. Gender-specific mortality tables are used, except where unisex is discussed. These tables do not differentiate expected lifetimes by socio-economic group. Thus, they probably overestimate the progressivity of the system. Joint pensions with 60% to survivor (70% in Argentina) are required for married men. Wives are assumed to be 3 years younger than and have 3-4 years longevity greater than their husbands. In Chile males retire at age 65, survive for 17.3 years and, if married, purchase a joint annuity that covers their wives who (at 62) are expected to live another 23.5 years. Females retire at age 60, at which point their life expectancy is 25.3 years. In Argentina men at age 65 survive 16.2 years while their wives (age 62) are expected to survive another 22.7 years. Women survive for 24.5 years at age 60. In Mexico both men and women retire at 65. Male and female life expectancies at 65 are 15.9 and 19.7, respectively. Wives at 62 are expected to live another 22.3 years when their husbands retire.

In all cases, pesos are converted into 2002 US\$'s by multiplying by the accumulated inflation between data year and 2002 (1.43 for Chile, 1.235 for Argentina, 1.69 for Mexico) and then converting according to 2002 exchange rates: 1 US \$ for 688 Chilean pesos, 3.21 Argentine pesos, 10.1 Mexican pesos.

Appendix Table 1: Slow growth scenario: accumulations, annuities and impact of public pillar on gender ratios in Chile

(Based on 3% return in accumulation stage, 1.5% in annuity stage, 0% real wage growth; 1994 data in 2002 US\$'s, accumulations in 000 US\$'s)

Education*	incomplete primary	incomplete secondary	Complete secondary	up to 4 post secondary	5+ years post secondary
Accumulations					
Men at 65	\$13.5	\$19.5	\$29.1	\$40.5	\$93.3
Women at 60	5.4	7.5	13.2	21.8	40.1
Women at 65	6.4	8.7	15.4	25.4	47.7
FC women	9.8	13.3	21.4	29.5	50.6
Ten-year women	3.2	3.8	5.0	8.0	12.8
Annuities and MPG					
Married Men					
Annuity at 65	\$ 60	\$ 87	\$ 130	\$ 180	\$ 415
Annuity + MPG	78	87	130	180	415
% increase by MPG	30%	0	0	0	0
Average Women					
Annuity at 60	\$ 22	\$ 30	\$ 53	\$ 87	\$ 161
Annuity + MPG	78	78	78	\$ 87	\$ 161
Annuity+MPG if wage-indexed	78	78	78	\$ 87	\$ 161
% increase by MPG	261%	160%	48%	0%	0%
Full career women					
Annuity at 65	\$ 46	\$ 63	\$ 101	\$ 139	\$ 238
Annuity + MPG	78	78	0	0	0
% increase by MPG	69%	25%	0	0	0
Ten-year women					
Annuity at 60	\$ 13	\$ 15	\$ 20	\$ 32	\$ 51
% increase by MPG	0	0	0	0	0
Female/male ratios					
Av.-Annuity only	36%	35%	41%	48%	39%
Annuity + MPG	100%	90%	60%	48%	39%
FC-ann.+MPG	100%	90%	78%	77%	57%
10-yr-ann. only	16%	18%	15%	18%	12%

Source: calculations by authors

*MPG is converted to actuarially equivalent monthly top-up. See Appendix for more details about data and methods.

Appendix Table 2: Estimated fund accumulations based on wage dispersion, Chile
(estimated accumulations given for deciles that accumulate less than MPG target)

	Incomplete Primary	Incomplete Secondary	Secondary	up to 4 years Post Sec	more than 4 years postsec
<i>Baseline:</i> (real r = 5% during accumulation, 3.5% during annuitization, real wage growth = 2%)					
Men at 65: Fund needed for annuity > MPG: 2002US\$14,115					
1 st decile	\$13,457				
Women at 60: Fund needed for annuity > MPG: 2002US\$15,360					
1 st decile	\$4,293	\$6,675	\$10,374		
2 ^d decile	\$6,412	\$9,541	\$14,331		
3 ^d decile	\$8,205	\$11,020			
4 th decile	\$9,731	\$12,541			
5 th decile	\$10,688	\$13,672			
6 th decile	\$11,880				
Women at 65: Fund needed for annuity > MPG: US\$(2002) 13,525					
1 st decile	\$5,599	\$8,689			
2 ^d decile	\$8,363	\$12,346			
3 rd decile	\$10,711				
4 th decile	\$12,711				
<i>Slow growth:</i> (real r = 3% during accumulation, 1.5% during payouts, wage growth =0)					
Men at 65: Fund needed for annuity > MPG: 2002US\$13,956					
1 st decile	\$5,803	\$8,421	\$10,639		
2 ^d decile	\$7,939	\$10,220	\$13,578		
3 ^d decile	\$9,070	\$11,941			
4 th decile	\$9,827	\$13,734			
Women at 60: Fund needed for annuity > MPG: 2002US\$19,488					
1 st decile	\$1,973	\$3,069	\$4,767	\$7,802	\$14,838
2 ^d decile	\$2,946	\$4,384	\$6,581	\$9,745	\$18,614
3 ^d decile	\$3,770	\$5,062	\$7,400	\$12,046	
4 th decile	\$4,470	\$5,762	\$8,406	\$14,234	
5 th decile	\$4,911	\$6,281	\$10,051	\$16,594	
6 th decile	\$5,459	\$7,312	\$11,833		
7 th decile	\$6,112	\$8,248	\$14,116		
8 th decile	\$7,108	\$9,620	\$17,389		
9 th decile	\$9,022	\$12,220			
Women at 65: Fund needed for annuity > MPG: 2002US\$16,577					
1 st decile	\$2,336	\$3,632	\$5,533	\$9,094	
2 ^d decile	\$3,488	\$5,087	\$7,664	\$11,353	
3 ^d decile	\$4,468	\$5,877	\$8,633	\$14,020	
4 th decile	\$5,302	\$6,690	\$9,800	\$16,563	
5 th decile	\$5,821	\$7,295	\$11,717		
6 th decile	\$6,475	\$8,491	\$13,800		
7 th decile	\$7,244	\$9,590	\$16,467		
8 th decile	\$8,436	\$11,181			
9 th decile	\$10,704	\$14,209			

Source: calculations by authors. Accumulation dispersion estimates are based on actual wage dispersion and average labor force participation rates within schooling groups. Data are from 1994 and 1994 MPG is used in 2002\$; MPG assumed to be price-indexed.

Appendix Table 3: Slow growth scenario: accumulations, annuities and impact of public pillar on gender ratios in Argentina

(based on 3% return in accumulation stage, 1.5% in annuity stage, 0% real wage growth; 1996 data in 2002 US\$'s, accumulations in 2002 US\$'s 000)

Education*	Incomplete primary	Incomplete secondary	Complete secondary	Some post-secondary	University degree
Accumulations					
Men at 65	11.5	17.6	26.3	27.3	52.8
Women at 60	3.0	4.3	8.5	11.8	23.1
Women at 65	3.5	5.0	9.9	13.8	27.0
FC women	7.6	10.4	17.1	17.8	31.0
Ten-year women	2.1	3.1	4.0	4.8	8.2
Annuities and flat benefits					
Married men					
Annuity at 65	\$51	\$79	\$117	\$122	\$236
Annuity + flat	128	156	194	199	313
% increase by flat	150%	98%	66%	63%	33%
Average women					
Annuity at 60	\$12	\$17	\$33	\$46	\$90
Ann. + flat (60/70)	66	71	87	100	167
% increase by flat	462%	322%	163%	117%	86%
Full career woman					
Annuity at 60	\$35	\$47	\$78	\$81	\$142
Annuity + flat (65)	112	124	155	158	219
% increase by flat	222%	162%	99%	95%	54%
10-year woman					
Annuity at 60	\$8	\$12	\$16	\$19	\$32
Annuity + flat (70)	62	66	70	73	86
% increase by flat	660%	447%	346%	289%	169%
Female/male ratios					
Av.-Annuity only	23%	21%	28%	38%	38%
Annuity+flat (65)	9%	11%	17%	23%	53%
Annuity+flat (70)	51%	46%	45%	50%	53%
FC-ann.+flat (65)	87%	80%	80%	80%	70%
10yr-ann.+flat(70)	48%	42%	36%	37%	28%

Source: calculations by authors

*Full flat benefit begins at age 60 for women, 65 for men. But most women are eligible for reduced flat, which begins at 70. Full career woman retires and begins full flat at 65. See text for discussion of eligibility for flat and reduced flat. See Appendix for more details about data and methods.

Appendix Table 4: Impact of public benefit on gender ratios of accumulations and monthly pensions in Mexico under slow growth

(based on: 3% return in accumulation stage, 1.5% in annuity stage, 0% real wage growth; 1997 data in 2002 US\$'s)

Education	0-5	6-8	9	10-12	13+
Accumulations					
Men at 65, no SQ	\$20.1	\$23.4	\$28.6	\$35.9	\$61.5
Men at 65, with SQ	29.1	32.3	37.6	44.5	69.7
Women, 65, no SQ	5.9	7.1	9.4	15.2	30.7
Women, 65 with SQ	10.3	11.4	14.2	20.6	37.2
Annuities including SQ					
Married Men at 65					
Annuity, no SQ	94	110	134	168	288
Annuity including SQ	137	151	176	209	327
% increase by SQ	45%	38%	31%	24%	13%
Average Women at 65					
Annuity, no SQ	28	33	44	71	144
Annuity incl. SQ	48	53	67	96	174
% incr. by SQ	74%	61%	51%	35%	21%
Female/male ratios					
Av.-Annuity, no SQ	29%	30%	33%	42%	50%
Av. ann. including SQ	35%	35%	38%	46%	53%

Source: calculations by authors

Note: The public pillar takes the form of the social quota (SQ), a uniform payment per day worked into the account of each worker. The SQ was set equal to 5.5% of the minimum wage initially, and thereafter was indexed to prices. Mexico also has an MPG = \$133 in 2002 US\$, but for men this is exceeded in every educational category after the SQ is added. Women in the bottom 4 educational categories have an annuity that is less than the MPG but they do not reach the 25-year eligibility requirement.

Appendix Table 5: Eligibility for MPG Taking Account of Dispersion in Years of Work in Mexico (Percentage eligible for MPG, percent with pension under MPG)
(Based on 5% real rate of return during accumulation, 3.5% during annuitization, 2% real wage growth)

Education	0-5	6-8	9	10-12	13+
Women					
Mean years worked	20.9	19.9	21.9	24.4	31.7
% under 10 yrs	25.5%	28.5%	24.5%	16.8%	5.9%
% under 20 yrs	47.8%	50.2%	45.6%	38.5%	19.9%
% under 24 yrs	57.3%	59.2%	54.8%	49.0%	28.9%
% over 24 years, eligible for MPG	42.7%	40.8%	45.2%	51.0%	71.1%
Av. pension with SQ	\$126	\$141	\$177	\$260	\$477
% with pension under MPG	52.6%	47.3%	37.5%	21.1%	4.9%
Men					
Mean years worked	45.0	44.3	44.6	43.9	42.8
% under 10 yrs	0.0%	0.0%	0.0%	0.0%	0.0%
% under 20 yrs	0.0%	0.0%	0.0%	0.0%	0.1%
% under 24 yrs	0.0%	0.1%	0.0%	0.1%	0.7%
% over 24 years, eligible for MPG	100.0%	99.9%	100.0%	99.9%	99.3%
Av. pension with SQ	\$364	\$407	\$478	\$573	\$909
% with pension under MPG	0.0%	0.0%	0.0%	0.0%	0.0%

Source: calculations by authors based on data in ENE97

Notes: Pensions are individual for women, joint for men. ENE97 respondents were asked how many years they had worked en total. Based on answers from women and men age 61-65, we calculated coefficient of variation. We then applied this coefficient to the mean accumulated experience estimated for our synthetic cohort. Assuming a normal distribution, we could then calculate percentages of our cohort that would have various years of experience (by educational category).

Figure 1A: More work and postponed retirement increase female/male ratios of accumulations, Chile

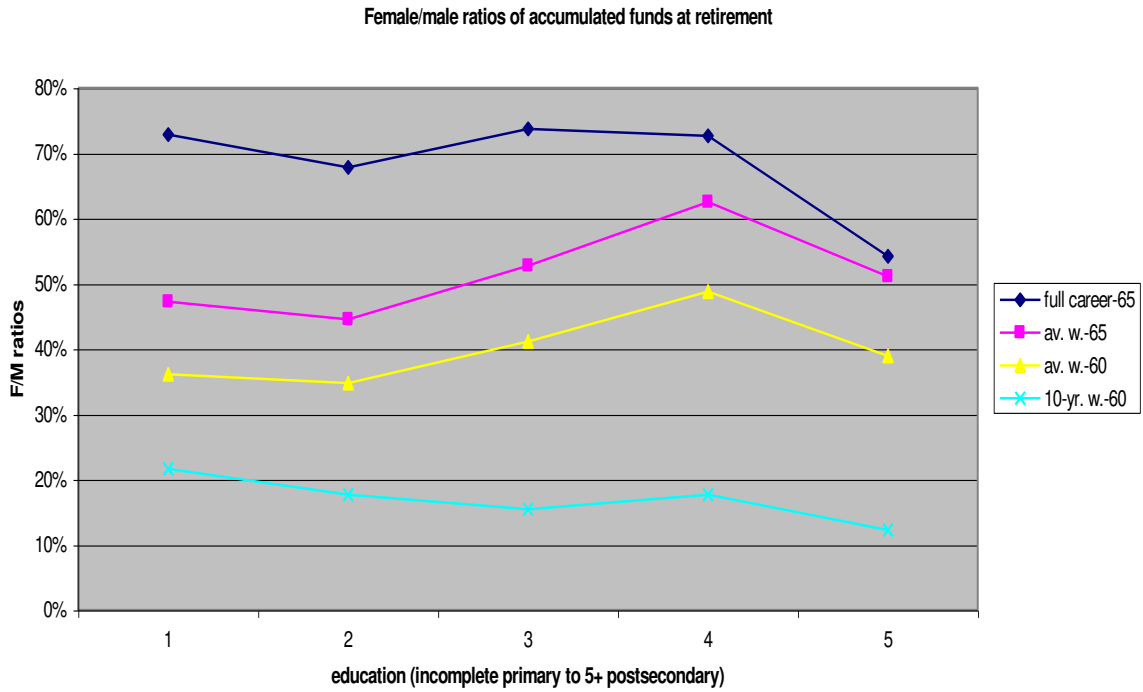


Figure 1B: More work and postponed retirement increase female/male ratios of accumulations, Argentina

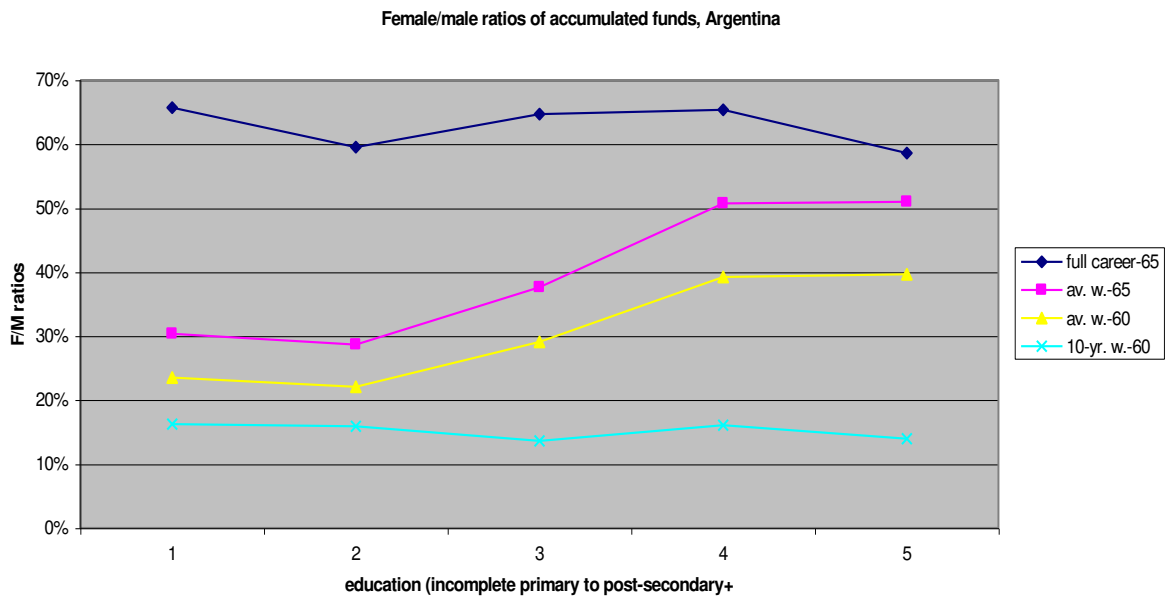


Figure 1C: More work increases female/male ratios of accumulations, Mexico

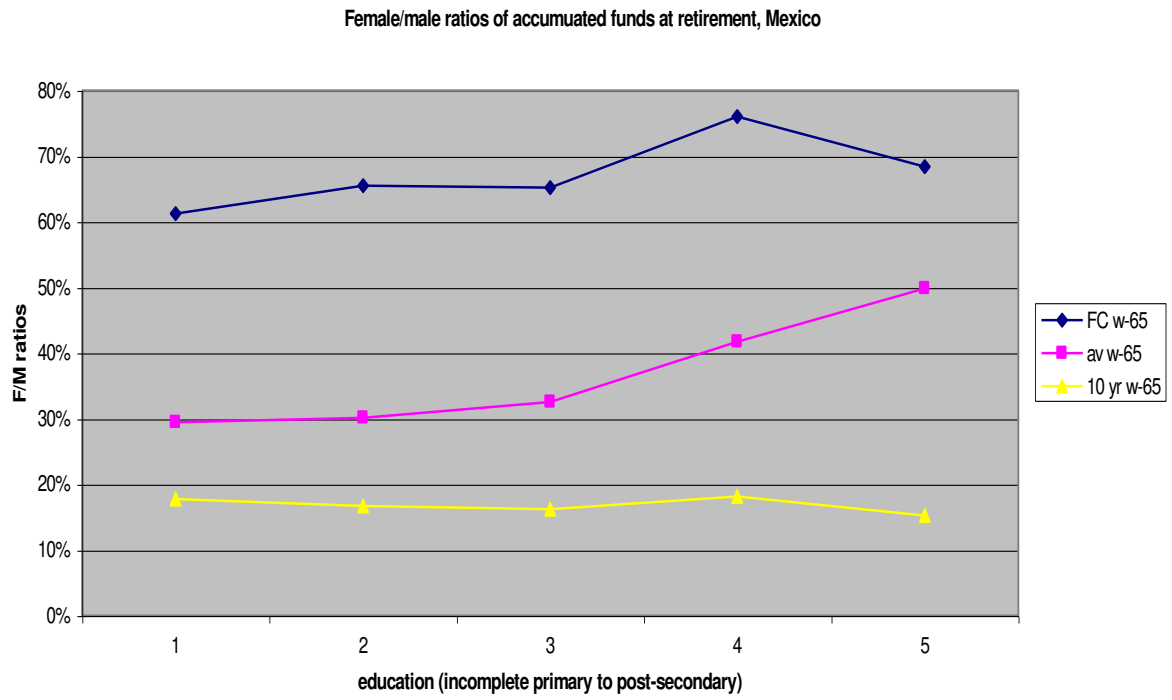


Figure 2A: Price-indexed MPG goes to lowest earners; wage-indexed MPG has much larger and broader impact, Chile

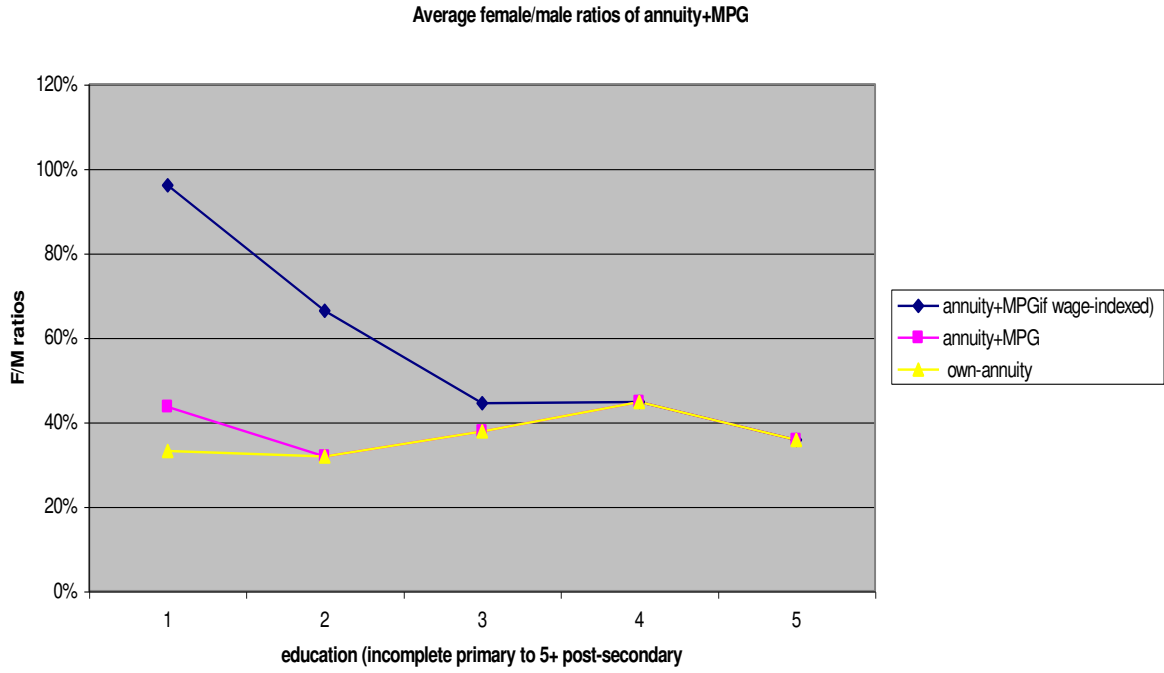


Figure 2B: Large % increment to ten-year women and low earners from flat benefit in Argentina

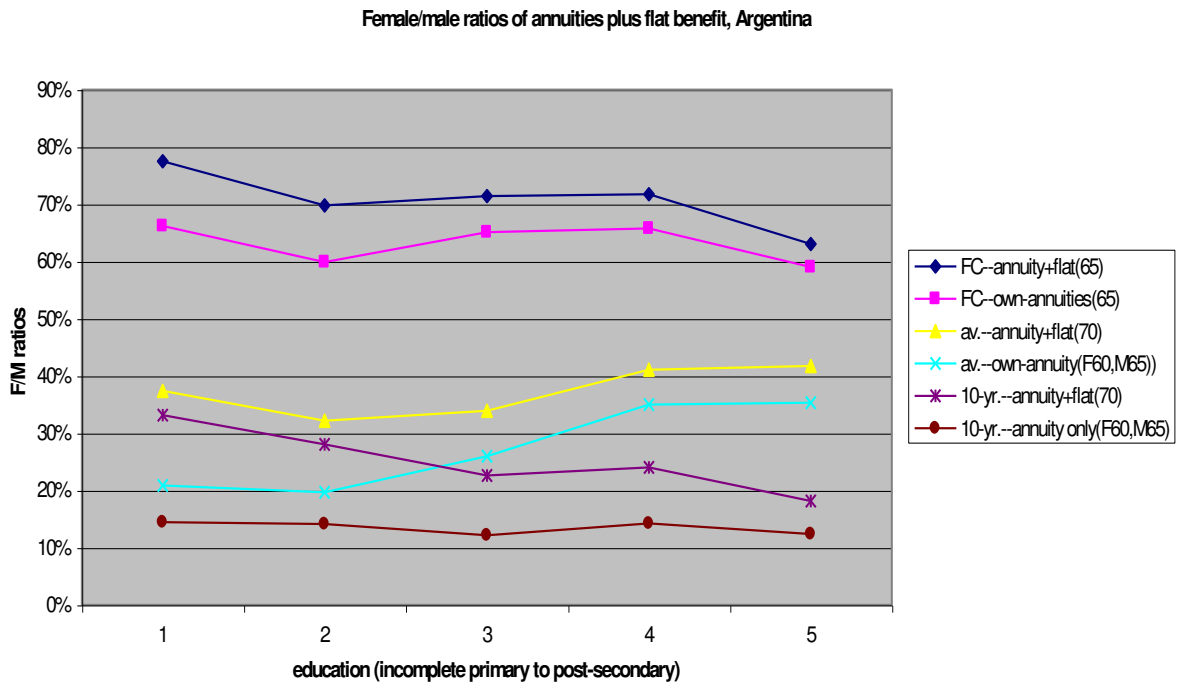


Figure 2C: Larger impact of SQ for low earners who work more in Mexico

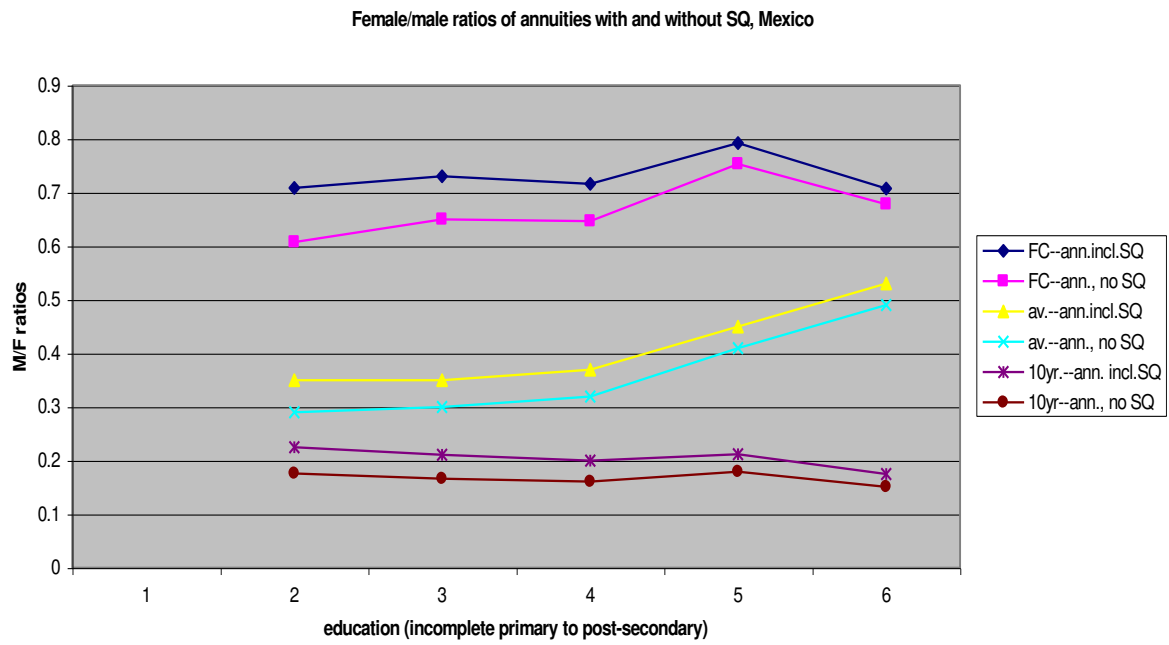


Figure 3A: Replacement rate for women exceeds that of men for full career women in Chile

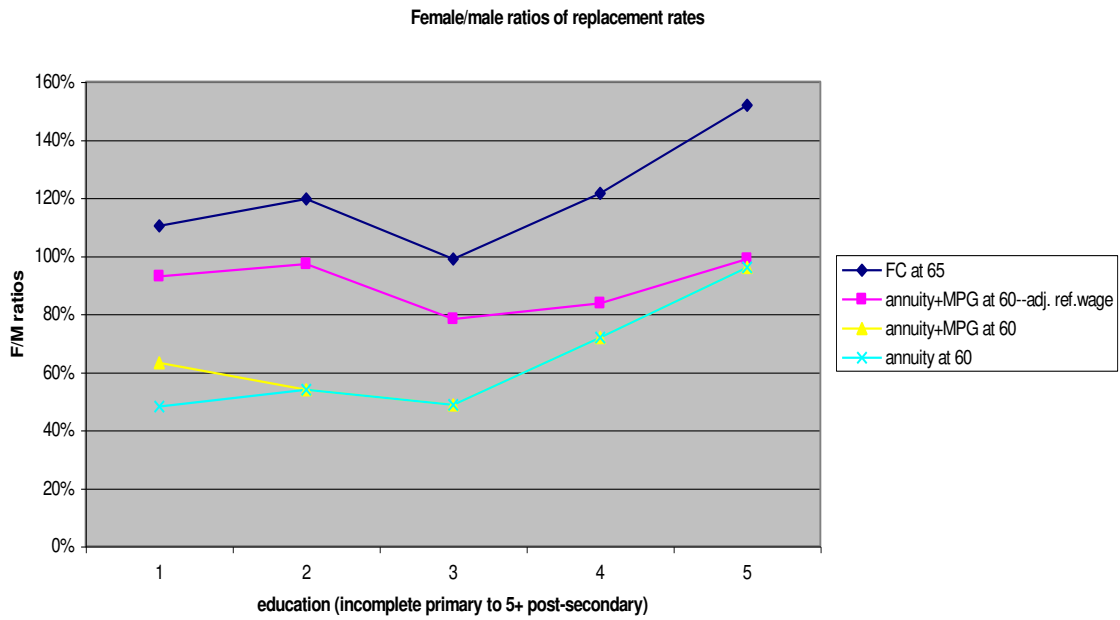


Figure 3B: Full career women and average women with adjusted reference wage have higher replacement rates than men in Argentina

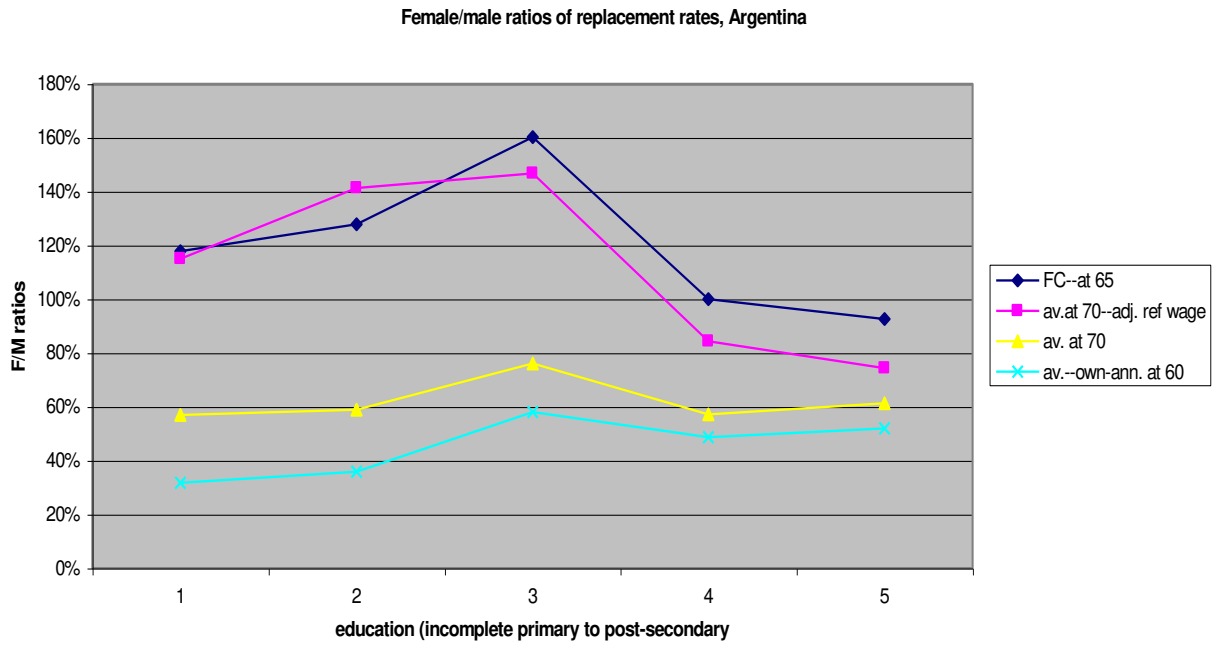


Figure 3C: Replacement rates for men for full career women and average women with adjusted reference wage far exceed those for men in Mexico

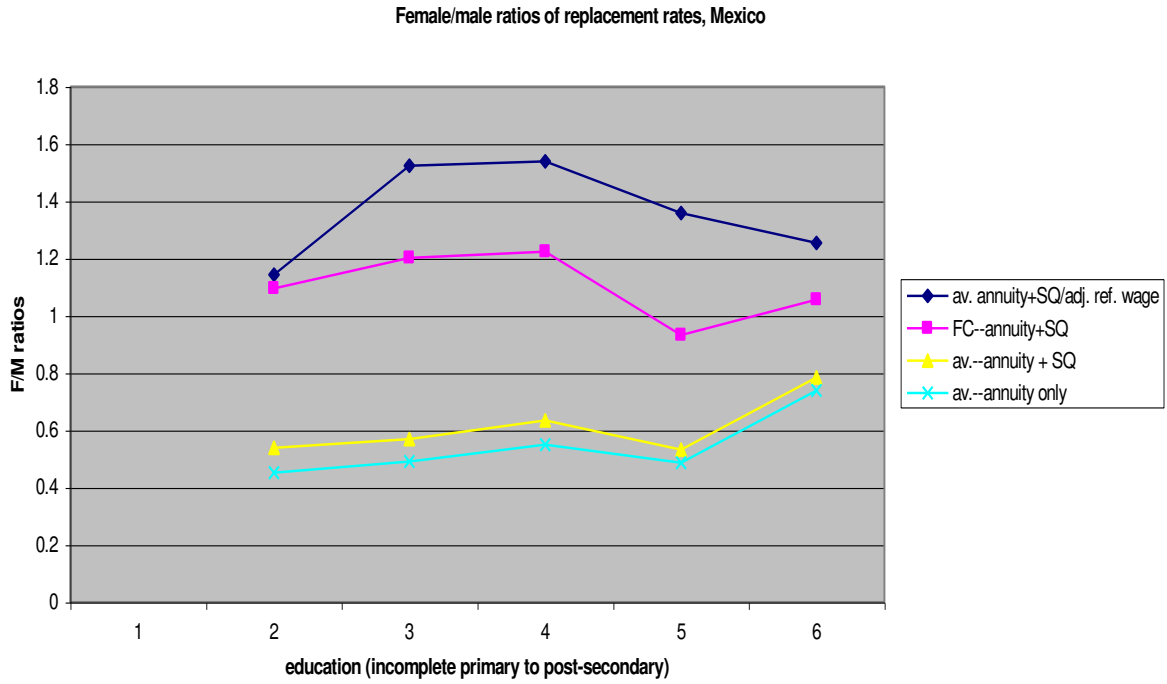


Figure 4: Loss to men and gain to women from unisex requirement is much less for joint than for individual annuity

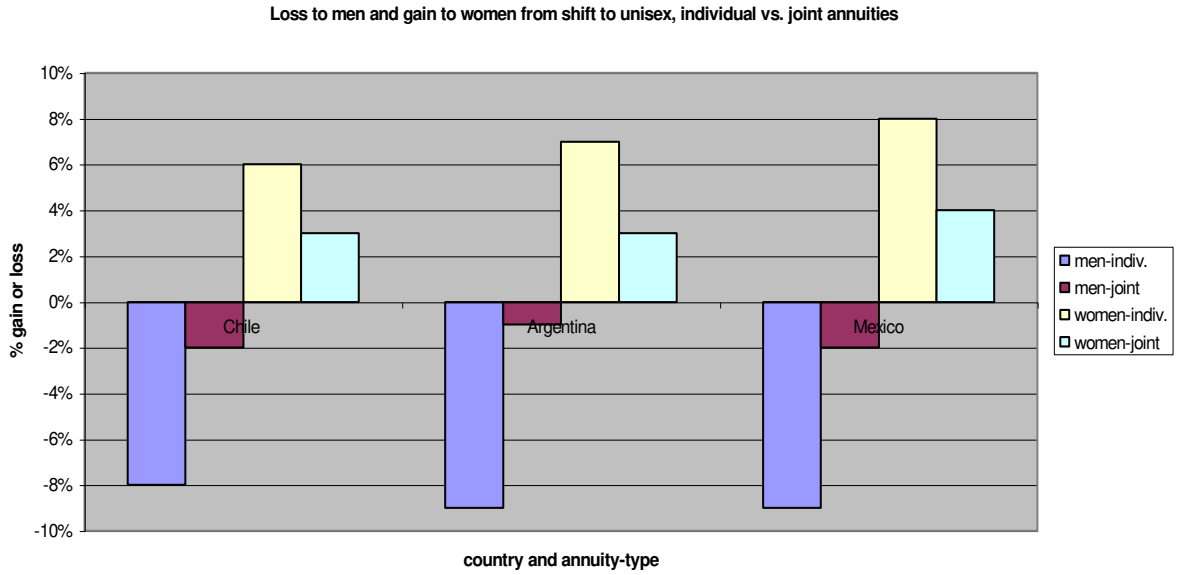


Figure 5: Women and low earners get largest % increment to EPV from public benefit

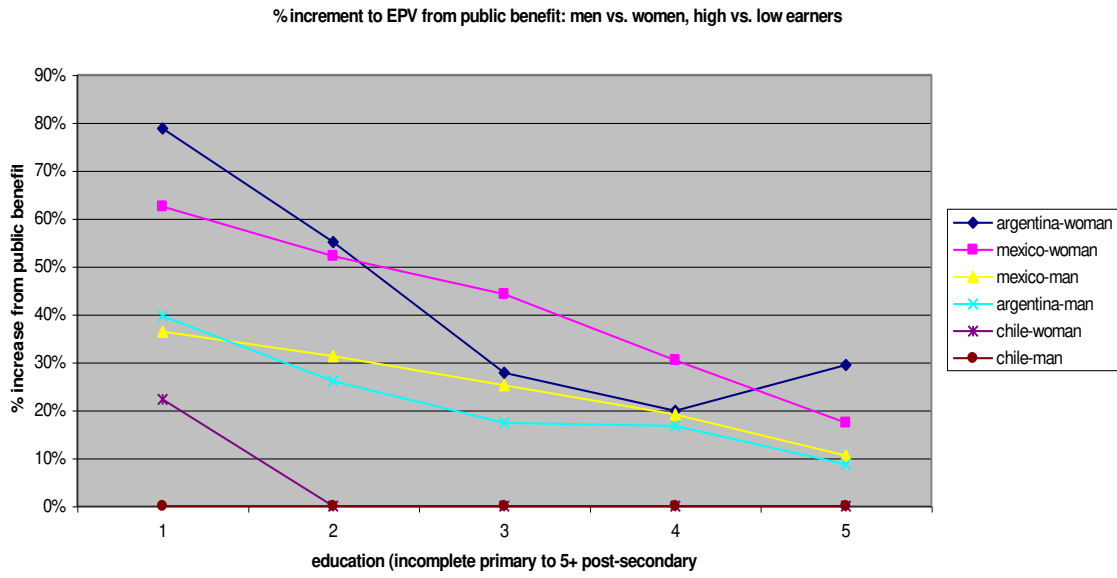


Figure 6: Joint annuity adds more than public benefit to EPV of average woman

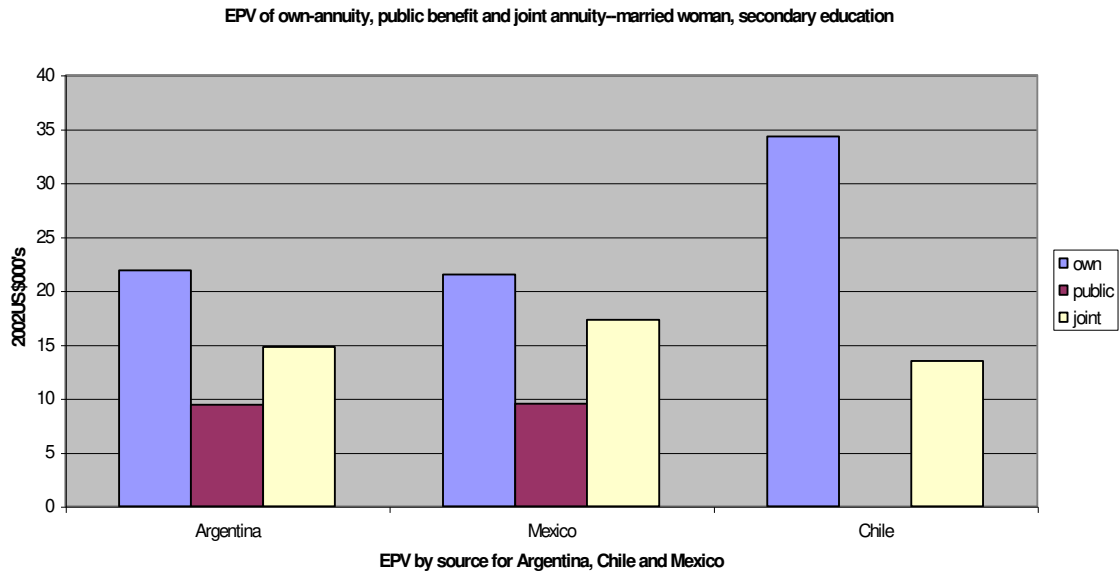


Figure 7A: EPV of full career married women exceeds that of men in Chile

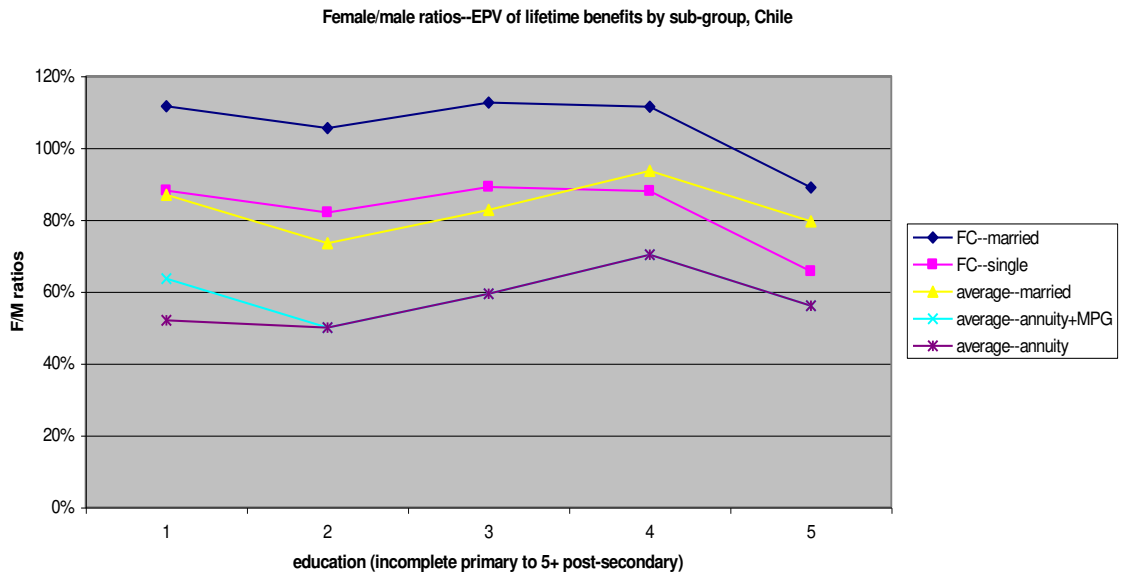


Figure 7B: EPV of full career married women exceeds that of men in Argentina

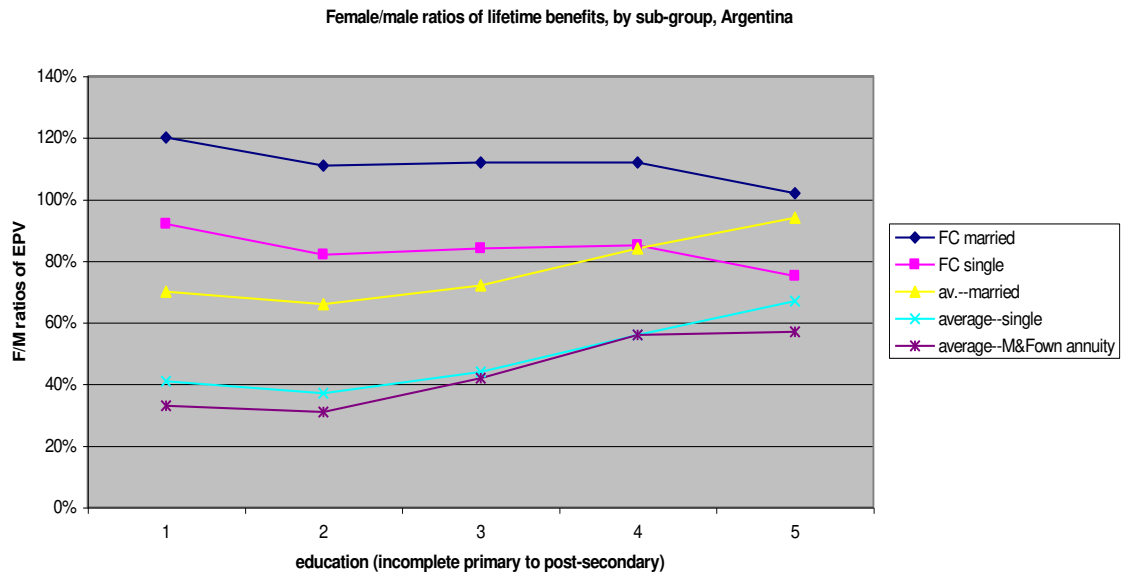


Figure 7C: EPV of full career married women exceeds that of men in Mexico

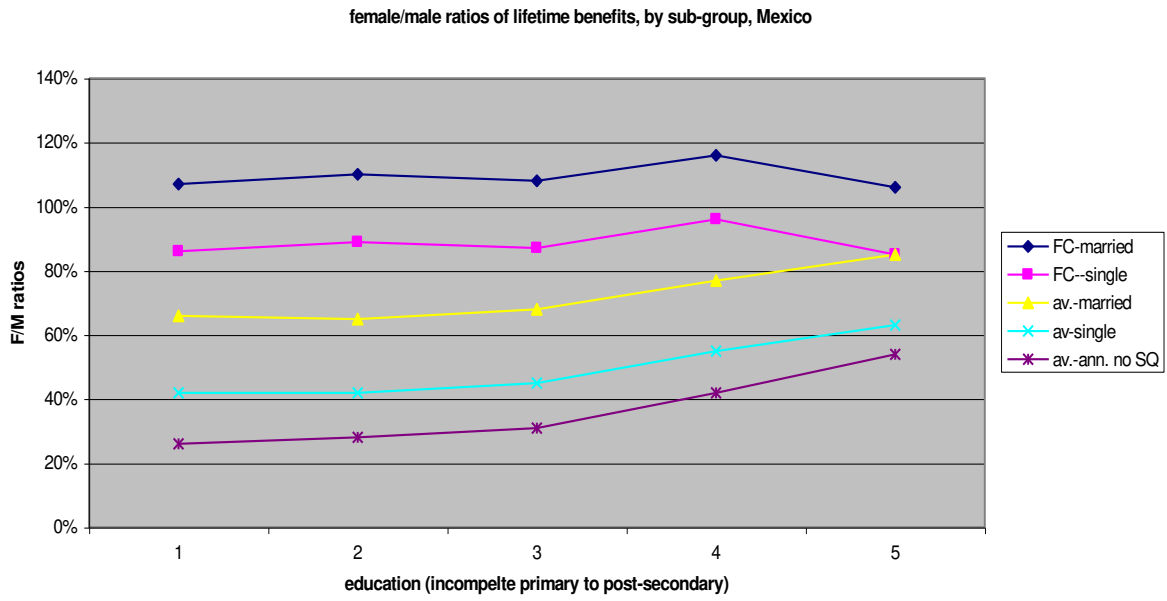


Fig 8A: Low earning full career married women and single men are biggest relative gainers from the reform in Chile

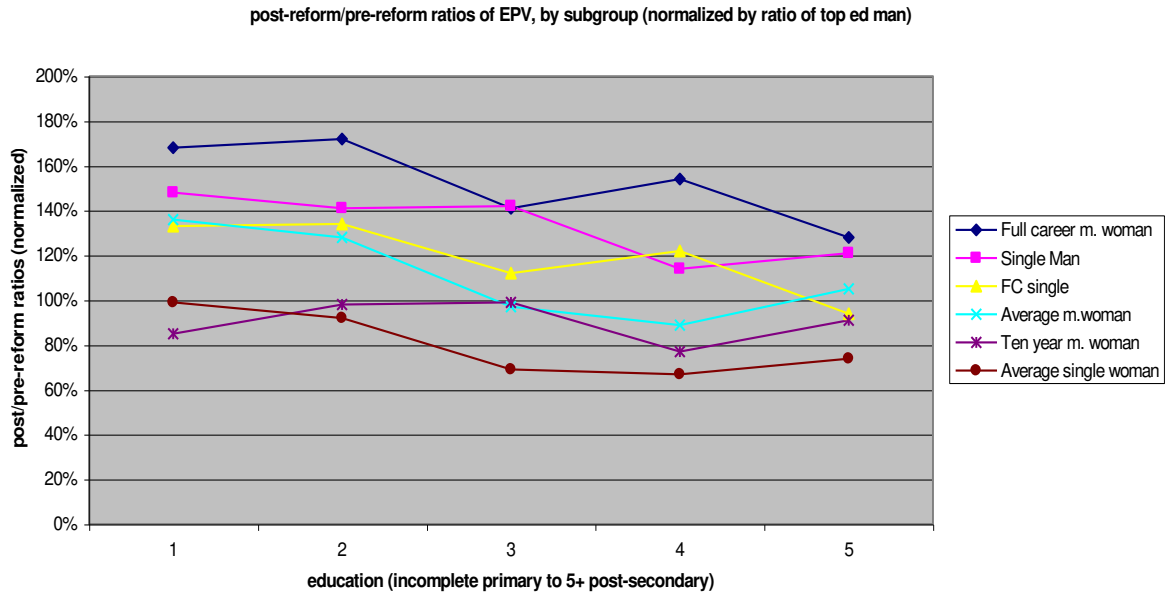


Figure 8B: All groups gained relative to top earning men, but low earning and ten-year married women gained most of all

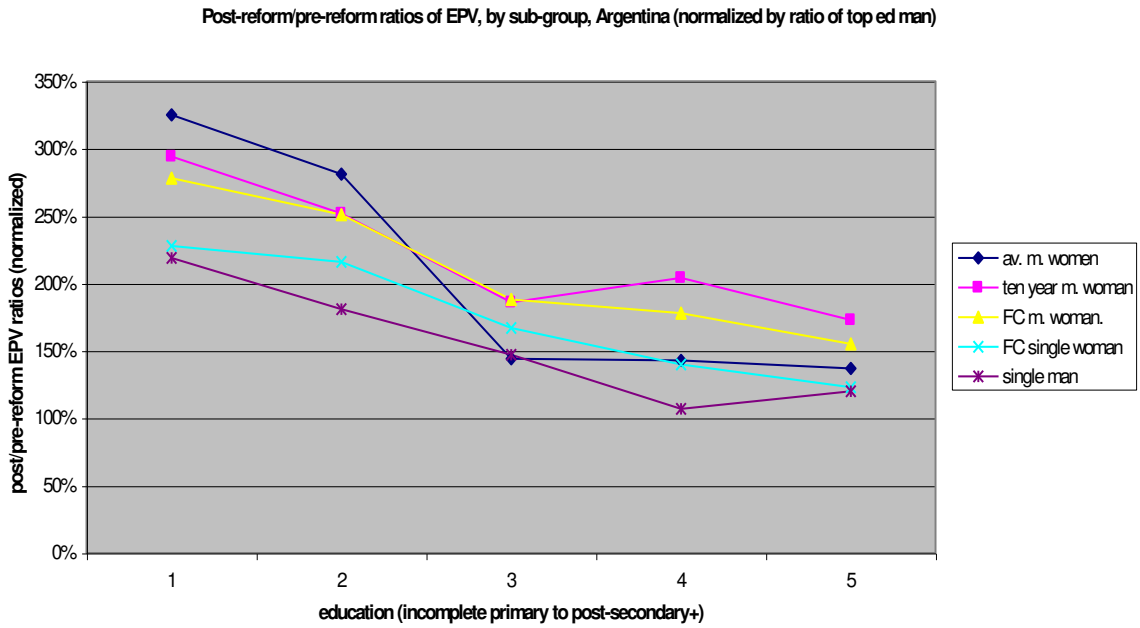


Figure 8C: Low earning FC single women and single men are biggest gainers from the reform in Mexico

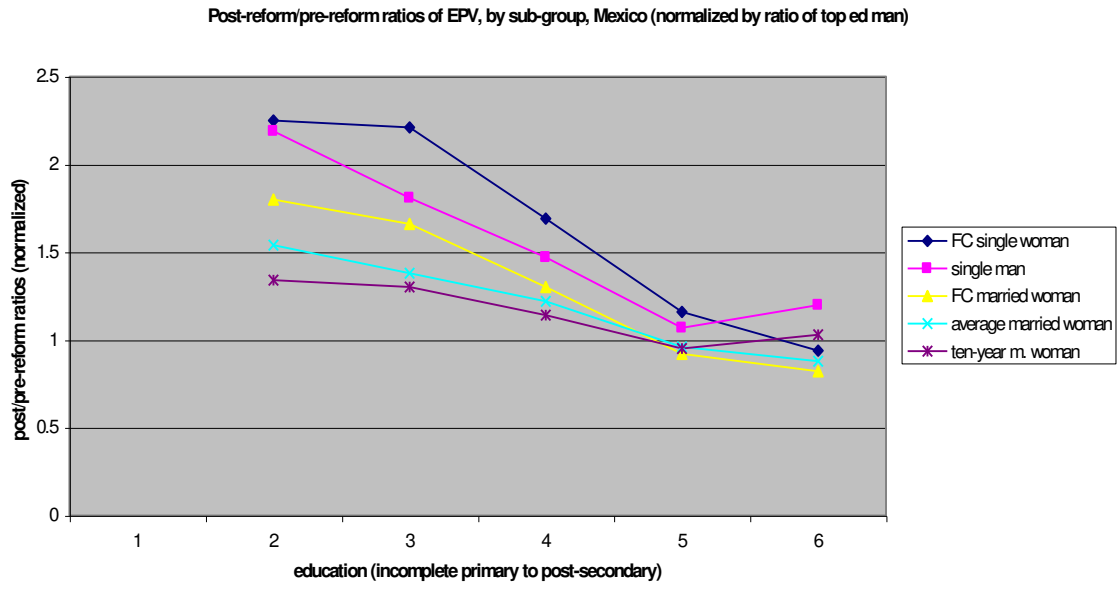
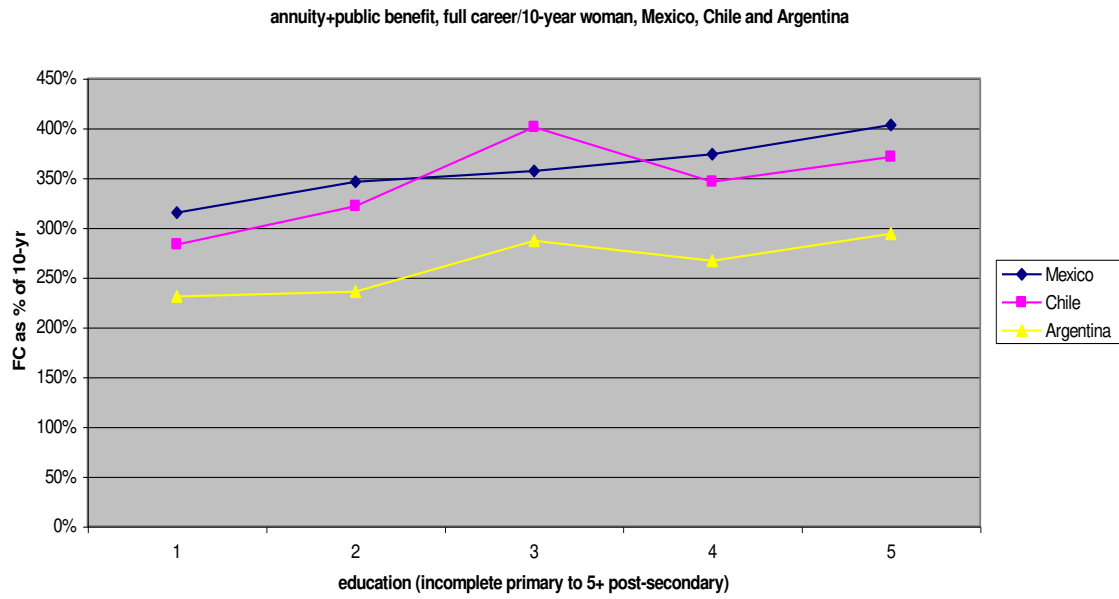


Figure 9: Full career women get lower pay-off for extra work (relative to ten-year women) in Argentina than in Mexico or Chile



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Endnotes

¹ This project was supported by the Economics and Gender Trust Fund at the World Bank, for which we express our appreciation. An earlier abbreviated version was published in James, Edwards and Wong 2003. For earlier papers coming out of this project on Chile and Argentina see Cox Edwards 2002, 2001a, 2001b 2000), on Mexico see Parker and Wong (2001), Wong and Parker (2001). The authors wish to thank Gustavo de Marco, Rafael Rofman, Hermann von Gersdorff, Augusto Iglesias and David Madero Suarez for their helpful comments on earlier versions and for answering our endless questions. We owe a special debt to Edward Whitehouse, for sharing with us his model for deriving actuarial factors, used to convert accumulations to annuity payouts.

² For example, in the U.S., for which such data are readily available, 60% of people over the age of 65 and 72% of those over age 85 are women and this disparity has been increasing through time. In the 85-and-over group, only 9% of women are still living with their spouses (Posner 1995). The poverty rate of women over age 65 is 15%, compared with 7% for men over age 65. The poverty rate for women over age 85 is 20%. For divorced, separated or never-married elderly women the poverty rate is 27% (Shirley and Spiegler 1998; also see Munnell 2004 and Street and Wilmoth in Ginn et al 2001). Using the Luxembourg Income Study database (LIS), Smeeding and Sandstrom 2004 conclude that poverty in old age is almost exclusively a problem of older women living alone due to widowhood or divorce. Women 65 and over and living alone have poverty rates of 30% in the US and 12% across 7 representative OECD countries if poverty is defined as 40% of adjusted national median disposable income. These numbers increase to 46% and 27%, respectively, if the threshold is defined as 50%.

³ For examples see World Bank 1994.

⁴ For a list of the countries that had adopted multi-pillar reforms as of 2000, and an analysis of the political reasons for their reform choices, see James and Brooks 2001. Many other transition economies have legislated plans for such reforms since 2000.

⁵ Other papers have discussed the projected replacement rates of men and women in Chile and Argentina, but none have systematically used current labor market behavior to construct a variety of synthetic individuals and their expected pensions under the new and old systems, nor have they examined multiple indicators. See Bertranou (1998 and 2001), Arena de Mesa and Montecinos (1999), Barrientos (1998).

⁶ Possibly for similar reasons, widows are also more likely to live alone in wealthier countries. For example, in Australia 34% of all women aged 70-74 live alone and this proportion rises to 46% for ages 80-84. In contrast, only 15% of men aged 70-74 live alone and this proportion rises to 24% for those age 85+. Men are more likely to live with their wives or other partners (Schulz 2000).

⁷ In urban areas in Mexico, in 1995, elderly women who were not in the labor force spent 34 hours per week in domestic activities, compared to 11 hours among elderly men who were not in the labor force. The disparity is even greater in rural areas. Nieto 1999.

⁸ Among men and women who receive a pension, 7% and 8%, respectively, get a family transfers. Among those who don't receive a pension, 16 and 21%, respectively, receive a family transfer.

⁹ Specifically, using available cross-sectional statistical data, we divided men and women into gender-age-education-marital status cells. A typical cell, for example, might consist of all married women with high school degree age 30-35. For each cell we obtained the average employment rates and wage rates for the current population. We then assumed that for each educational level, an average man or woman who enters the labor force today proceeds through life with the age-specific employment probabilities and wage rates that were derived from the cross-sectional data. For simulations where positive economy-wide wage growth was assumed, we multiplied the age-specific wage rate by the projected growth factor. Contributions depend on these employment histories. Data on marital state enabled us to identify the age, \underline{M} , at which the probability of being married > 50%. In constructing our synthetic men and women, we used the employment probability and wage rate of the single individual up to age \underline{M} , and the married individual after age \underline{M} . A sharp decline in the labor force participation rate of women typically occurred when they got married.

¹⁰ Interestingly, their wages are not like that of men; in fact, they are slightly lower than those of married women (perhaps because of selection bias--married women are more likely to work if they have a high wage offer, while single women work even if they have a low wage offer). This suggests that the female/male wage differential is not primarily due to differential job experience.

¹¹ This method estimates a regression equation as follows:

$$Y_1 = X_1 b_1 + e_1$$

$$Y_0 = X_0 b_0 + e_0$$

where Y_0 , Y_1 are dummy variables for labor force participation at time 0 and time 1, respectively, X_0 , X_1 are covariates of participation at time 0 and time 1 respectively, and the e 's are the corresponding error terms. In this analysis time 0 is 1970 and time 1 is 2000. We estimate the regressions using probit regression and obtain coefficient estimates for b_0 and b_1 . We use these coefficients to estimate predicted values for employment, as follows:

$$X_0 b_0, X_1 b_0, X_0 b_1, X_1 b_1$$

Then we can express the difference in participation between time 0 and time 1 as:

$$Y_1 - Y_0 = (X_1 b_1 - X_1 b_0) + (X_1 b_0 - X_0 b_0)$$

The first term in the right hand side, $(X_1 b_1 - X_1 b_0)$, is the effect of change in coefficients, or the change in the propensity to be employed, holding the educational composition constant. The second term, $(X_1 b_0 - X_0 b_0)$, is the effect of change in the educational composition, holding constant the propensity to be employed.

¹² For younger and older age groups the change in over-all employment was much smaller and entirely due to increased schooling. Possibly younger age groups don't work more in 2000 because more of them are still in school, while older age groups don't work

more because more of them retire early, but those with more education are the ones to stay in the labor market.

¹³ Women under age 25 actually experience a decline in labor market participation due to a shift in education, possibly because they remain in school longer. This will offset some of the positive effect of schooling after they pass age 25.

¹⁴ We carried out a similar decomposition for the US, using labor force participation rates and educational composition for 1970 and 1999, from Blau, Ferber and Winkler 2002. We expected education to play a less important role here, because the gains in schooling were less dramatic than in low and middle income countries. The aggregate female labor force participation rate for women aged 25-64 was 49% in 1970 and 73% in 1999, an increase of 49% over this period. We found that 65% of the increase in aggregate female labor force participation was due to an increase in work propensities within educational categories, 16% was due to a shift in educational composition, and the remaining 19% was due to the interaction between the two. We observe a big shift in educational composition away from those with high school education or less and toward those with some college education or a college degree. At the same time, the biggest increase in labor force participation occurred among those with college education—the association between education and participation rates grew over this period, hence a large role for the interaction effect.

¹⁵ In Chile, which introduced portfolio choice in 2002, workers are required to invest in low-risk portfolios during the ten years prior to retirement. The earlier retirement age for women therefore, in effect, requires them to make more conservative investments with a lower expected return for a higher percentage of their adult lives. We abstract from this difference in our analysis, thereby slightly understating the expected gender gap in accumulations. For the U.S. literature on this topic see Bajtelsmit, Bernasek and Jianakoplos 1999; Bernsak and Shwiff 2001; Jianakoplos and Bernasek 1998; Lyons and Yilmazer 2004; Sunden and Surette 1998; Hinz, McCarthy and Turner 1997; also on Sweden see Save-Soderbergh 2003. For partial surveys of this literature see U.S. General Accounting Office 1997, Burnes and Schulz 2000, Shirley and Spiegler 1998.

¹⁶ In reality most adjustments to insolvency have not been distributionally neutral. For example, maintaining fiscal balance through inflation, with indexation applying only to a minimum pension, hurts high earners disproportionately, while raising the payroll tax rate subject to a fixed maximum hurts low earners, and equalizing retirement ages for the two genders hurts women, especially in a DB plan. An infinite number of such reforms, with divergent distributional effects, are possible. Each of these non-neutral reforms could then be compared with a distributionally neutral reform, as we do here for the multi-pillar reforms that were actually chosen in these countries.

¹⁷ This bias is reduced but not completely eliminated in defined benefit systems such as that in the U.S., which index up the earlier wages according to economy-wide wage growth and base the pension on total lifetime indexed wage.

¹⁸ By 1979 the old system was composed of 32 pension funds with more than 100 different programs. It is difficult to obtain precise information about all these sub-systems. These descriptions are based on SAFP 2003, Cheyre 1991 and personal communications with Augusto Iglesias, Primamerica. The defined benefit formula we present applied to the largest scheme, Servicio Seguro Social (SSS), which covered two-thirds of total contributors (mainly blue collar).

¹⁹ Data on administrative and insurance costs are from James et al 2000 and 2001. More recent data indicate that fees have fallen about 10-15% in our three countries (AIOS 2005). Fees in Chile were initially about 3% of payroll but more recently have fallen to 2.5%. Almost half of this fee is for a group survivors' and disability insurance policy that covers all contributing workers.

²⁰ Formal employment is established by a written contract that employers and employees sign.

²¹ Our method of estimating the applicable monthly wage rate, while simplistic, has several advantages. It does not impose a particular functional form and it implicitly weights the sample according to its composition (by other characteristics) within each cell. The human capital earnings function, in which earnings are expressed as a quadratic in potential experience, might have appeared to be an alternative estimation method. However, it is not the most appropriate here, because we lack a good proxy for female experience. (Age is sometimes used as a proxy for experience, but the gist of the issue here is that it is a differential proxy for men and women, and we are seeking to identify the pension implications of this differential). We chose a five-year age interval as a compromise between increasing sample size in each cell versus keeping the age categories narrow, since estimated salaries for a range of years are likely to overestimate starting-period salaries and underestimate end-period salaries.

²² If women do not have enough money in their accounts to purchase an annuity above the MGP level upon retiring, they are required to withdraw their own savings at the MPG level until their accounts are empty, at which point the government subsidy takes over. For expositional purposes we assume they annuitize and we calculate the monthly top-up needed to get them to the MPG point.

²³ Basing the MPG on own-accumulation makes it easy and cheap to monitor and avoids issues concerning the intra-family division of resources that arise in a means-tested program based on family income, but it may also mean that society's limited redistributive funds are being spent on women from middle class families who can afford to forego market work and income. This has been documented by Salvador Valdes (Valdes 2002. Table 1.1, p. 60). Much of Valdes' data are from minimum pension eligibility in the old system but this danger exists in the new system too. Similar observations have been made about the social security system in the US, which has a progressive benefit formula that subsidizes middle class women who have limited labor market earnings because they have spent much of their time working in the home rather

than in the formal market. (See Coronado et al 1999, Coronada et al 2000, Gustman and Steinmeier 2001).

²⁴ Retirees with large accumulations usually annuitize, while those with small accumulations usually choose or are required to take programmed withdrawals. As of 2003, 76% of men but only 54% of women old age retirees had annuitized. The group with the lowest pensions are normal age retirees on programmed withdrawals; 18% of men but 42% of women fell into this category. Taking into account both programmed withdrawals and annuitants, who retired at the normal age or earlier, 44% of women but 31% of men were at the MPG floor. The female/male ratio of pensioners at the minimum level increases sharply if we include widows--beneficiaries of joint pensions or survivors insurance. The number of widow recipients on programmed withdrawals is almost the same as the number of female old age pension recipients and 78% of both groups are at the pension floor. Moreover, since women live longer than men and use up their money in the meantime, the female share of pensioners at the floor will be much higher as they grow very old. For further information about payouts see James, Martinez and Iglesias 2006.

²⁵ During the accumulation stage, husbands are required to purchase survivor's insurance for their wives. A small amount of the total contribution (about 1% of payroll) is used for survivors' and disability insurance. We do not include the value of survivors' benefits during the working stage in our calculations; in this sense we understate the transfer from men to women in the form of survivors' insurance. Survivors insurance is financed by a similar charge to all workers, whether married or single, men or women. Women workers pay the premium although their husbands will not collect the benefit as widowers unless they are disabled or otherwise financially dependent on their wives. Thus, this is a pure tax to working women but a positive transfer to women in their roles as surviving wives.

²⁶ The key assumptions determining payouts are age of wife and % to survivor—the younger the wife and larger the percent to survivor, the more the husband's benefit will decline, even under unisex, when a joint annuity is purchased.

²⁷ Taxes as well as benefits changed in the process of the reform. Contribution rates to the pension system were cut substantially when the new system was adopted. Transition costs have had to be covered out of general revenues as a result of the switch to the new system, much of it through cuts in government spending. Moreover, as we have seen, the MPG will put a burden on future general tax revenues. We measure the impact of the reform relative to the counterfactual that these tax changes are levied in a way that leaves relative positions unchanged.

²⁸ If the minimum pension was indexed in the old system while pensions were not indexed generally, eventually most retirees would have gotten the minimum—thereby achieving gender equality, but at a very low level. This was the situation in some Latin American countries before the reform.

²⁹ Specifically, for each subgroup i we calculate $(PV_{new}/PV_{old})_i / (PV_{new}/PV_{old})_k$, where $(PV_{new}/PV_{old})_i$ = ratio of present value of lifetime benefits in new versus old systems for group i and reference group k = married men in the top educational category.

³⁰ See <http://www.safjp.gov.ar/Digesto/ley24241.htm>

³¹ In our simulations we assume that average women in the bottom two educational categories, who worked less than 20 years, qualified for the ten-year option, while women in the top three educational categories qualified for the more generous twenty-year option. Women in the bottom educational category received the minimum pension, which exceeded their own-pension. The average man in all educational categories was eligible for the twenty-year option and his own-pension exceeded the minimum pension.

³² Workers have a choice between a private account that is similar to the Chilean model and a public defined benefit (called PAP). PAP is available only to workers with more than 30 years of contributions; workers who contribute for less than 30 years lose all their contributions—so PAP is particularly inappropriate for women. Workers who enter PAP can later switch to the private scheme, but not vice-versa—one of the reasons why participation in PAP is less than 20%.

³³ Payroll contributions towards pensions are part of a much larger package of payroll contributions for social insurance in Argentina compared with Chile. Total payroll contributions range between 22 and 33 percent of gross wages in Argentina, compared with 16.7 percent of gross wages in Chile.

³⁴ In fact, more than half of all current retirees are at the minimum (personal communication with Rafael Rofman, April 4, 2005). Most of them retired under the old system rules—but our simulations show that with a high minimum and low contribution density, the same outcome is predicted for the new system.

³⁵ Law 18_037 (Dec 68) article 37 # 3 stated that the right to a widow's pension is conditional on "not receiving an old age benefit." However, in practice women often received both, in part because husband and wife were in different sub-systems and in part because of poor records and uneven enforcement.

³⁶ Supposedly, to qualify for a pension work had to be done during the five years immediately prior to retirement. This would have excluded many women who worked ten years and then withdrew from the labor force upon marriage and child-bearing. In this chapter, we assume that these women somehow managed to qualify for a pension. This creates a bias in favor of the old system. In the new system there is no doubt that they would have property rights to the money in their own accounts, including the SQ.

³⁷ In 2004 the government made it more attractive for workers to stay in the old system upon retirement. Defined benefit amounts were increased and indexed to prices. In addition, workers are allowed to withdraw about 30% of the balance in their accounts, if they choose the old system.

³⁸ Additionally, to avoid political opposition from organized groups, the government excluded federal employees (covered by ISSSTE), the armed forces, and oil worker systems from the reform. Besides mandatory coverage, workers may make voluntary contributions but less than 1% of all contributions are voluntary (Sinha and Yanez 2006).

³⁹ Although ten-year women haven't worked as much as our other prototypes, they get a large percentage increase in benefits from the SQ. This may seem surprising, given the close ties between the SQ and work. Two reasons account for this: the SQ is a constant reward for days worked, so it is a higher proportion for those with lower wage rates, and it does not rise with wage growth in the economy. Ten-year women work early in their adult lives, so the SQ they get is higher relative to their wage than it is for full career women, some of whose wages come later and are much larger.

⁴⁰ Most data for the FSU countries are from Castel and Fox (2001) and from personal communications with Castel and Fox. Data for Poland are from Woycicka (2001) and from personal communications with Chlon-Dominczak. Other data on Eastern European countries are from Whitehouse 2003.

⁴¹ In Poland women get credit in the public pillar for years on maternity leave, but only at the minimum wage level. In Latvia credit is given for a maximum of 1.5 years of maternity leave. In Kazakhstan pension credit for maternity leave and child-care were eliminated.

⁴² Collective agreements that cover most workers provide for survivors' benefit—but these vary by occupation and tend to be less generous for low-paid workers.

⁴³ Coverage is less than 100% because workers earning less than A\$900 per month are exempt, and many of these are women.

⁴⁴ Similar numbers are found in the UK, where women's labor force participation is only 65% that of men and 40% of this is part-time. Average hourly earnings for women are only 75% those for men, and most of this gap persists among full-timers. The gap increases with age, as in Latin America. Employment and earnings gaps are especially great for women with children (Ginn, Street and Arber 2001).

⁴⁵ The UK also offers a flat benefit and means-tested benefits as part of its multi-pillar system, but with different costs and targeting than either Australia or Argentina. In the UK the basic flat benefit requires 39 years of contributions from women (44 from men). This eligibility requirement might at first appear to disqualify most women. However, years caring for children or frail or disabled adults can be substituted for paid employment and part-time work counts, so most women qualify. High earners are not excluded from the UK benefit, which makes it potentially more expensive than that in Australia. To offset these costs, the UK basic benefit is indexed to prices not wages. Consequently, although it started at 20% of the average male wage it is now less than 15% and projected to fall to 7.5% by 2050. This low level might leave many low earners, especially women, in relative poverty. To prevent this and to assist women who don't

qualify for the basic benefit, it is supplemented by narrowly targeted means-tested benefits; women are the major recipients. While this is supposed to protect the low end, there is much concern in the UK about the stigma and take-up problems among this group. The UK system is now under broad review and is almost certain to change, in part because of dissatisfaction with the declining basic benefit and heavy reliance on means-tested benefits.

The broad middle-class, including many widows, gets less in the UK than in Australia, since the basic benefit is smaller. In contrast, high earning families, especially men, get more when the lower tax cost of the UK system is taken into account. This also suggests that work and saving disincentives are less in the UK. Simulations that combine the private and public pension find that women in the UK receive total benefits that are 60-70% those of men, after they claim the basic and means-tested benefits in addition to their own pension (Falkingham and Rake. 2001). This is much higher than the gender ratios of monthly pensions in Chile and Argentina, largely because of the more equalizing combination of basic and means-tested benefits as well as the higher gender ratios of employment and wages in the UK. However, it is lower than the gender ratios of lifetime benefits in Chile and Argentina when the joint annuity is included. (Joint annuities are not required in the UK).

⁴⁶ Considerable controversy surrounds the magnitude of the work incentive effects stemming from higher taxes. Studies in industrial economies indicate that the labor supply of prime-age males is relatively inelastic with respect to tax and wage rates. Women's labor supply may be more sensitive, since net wages may influence their allocation of time between market work, which is taxed, and home work, which is not taxed. A rise in tax costs may wipe out the margin that made market work attractive to women. The choice of retirement age seems to be especially sensitive to payroll taxes (Gruber and Wise 1999). This suggests that the labor supply of older workers may be more wage-sensitive than the labor supply of younger workers. In Chile the labor force participation of older workers increased dramatically after the reform (Edwards and James 2006). And the decision of older women to stay in or withdraw from the labor force may be most sensitive of all. Recent research shows that incentives in the U.S. system encourage women to work less in prime age and to retire early, because their retirement income depends mainly on their husband's pension rather than on their own contributions (Munnell and Soto 2005, Munnell and Jivan 2005).

Furthermore, higher taxes may push workers to the informal or underground economy. Given their interrupted careers and part-time work patterns, women seem especially prone to informality and to incentives that increase informality. While informal work to evade taxes and regulations exists in all countries, it is particularly prevalent and accessible in low and middle-income countries. If productivity is lower in the informal sector because of less access to capital, credit and marketing channels, this becomes a source of inefficiency in the use of labor.

⁴⁷ The new notional defined contribution plans in the transitional economies similarly penalize women who retire early; in fact, this is one of the ways these schemes are expected to save money, compared with the old systems.

⁴⁸ In the UK, the load (difference between initial premium and present value of future benefit stream) charged for indexed annuities is about 7-10% of the premium, while it is close to 0 for nominal annuities. In Chile, by contrast, loads for indexed annuities are only 1-2% of the premium. The difference may stem from the fact that many indexed financial instruments are available in Chile, which enables insurance companies to insure against inflation while still earning a rate of return that exceeds the risk-free rate, while this is not true in the UK. See James, Martinez and Iglesias 2006.

⁴⁹ In Chile women are required to purchase individual pensions upon retirement unless their husbands are disabled. In Argentina and Mexico both men and women must purchase joint pensions. In all three countries, workers of both genders are also required to purchase survivors' insurance while working. This, however, is financed as an equal percentage of wages—less than .5%—for all workers, so singles subsidize married couples in this case. Workers may be treated differently from retirees because the insurance is provided on a continuing basis rather than as a one-time transaction and it would be difficult to continually monitor marital status and its change. In Chile, the wife is covered by survivors' insurance, but husbands are covered only if they are disabled. Nevertheless, working women pay the same insurance fee.

⁵⁰ In the U.S., voluntary employment-based defined benefit plans are legally required to pay equal monthly benefits to men and women, implying unisex tables, and a joint annuity is also required, unless the spouse specifically waives that right. However, voluntary 401k plans are typically paid out in a lump sum. If the worker decides to annuitize, gender-specific tables may be used and individual annuities issued. The rules might be quite different if these or similar accounts became part of the mandatory system.

⁵¹ That is, companies with disproportionate men might pay the central authority the difference in expected payouts under unisex and gender-specific tables for each man above the national norm, while companies with disproportionate females would receive the counterpart difference for each woman above the national norm.

⁵² Chile's MPG loses some of this advantage. Technically it is means-tested against other income as well, since the individual is required to sign a statement that he or she has no other pensions or wages. This broader income test is supposedly monitored by the pension fund with which the individual is affiliated, not by the government. These funds have little incentive to spend resources on implementing the means test and we have no evidence on how effectively this is done.

⁵³ Valdes' data include many women from the old system. However, the basic principal remains that many women who qualify for a minimum pension will qualify precisely because they come from middle and high income families and therefore can afford limited labor force attachment.

⁵⁴ One study found that many recipients of means-tested pensions in India were required to pay bribes and high transactions costs in order to receive their benefits. Another study

reported poor record-keeping and long delays in establishing eligibility and obtaining pensions (Palacios and Sluchynskyy 2006).

⁵⁵ South Africa offers a broad-based means-tested pension that reaches a high proportion of the elderly, especially rural women. Since the extended family structure prevails, studies show that this benefit is shared with other family members including young children and middle-aged men.

⁵⁶ For a fuller examination of experience with social pensions, including flat and means-tested arrangements, in multi-pillar systems and mono-pillar systems see Palacios and Sluchynskyy 2006.

⁵⁷ For the recent empirical literature demonstrating this for the US, see Coronado et al 1999 and 2000; Gustman and Steinmeier 2000.

⁵⁸ Consider the common case of a spousal benefit while husband is alive or a widow's benefit after his death, whose size depends on husband's earnings, as in the U.S. The married woman may receive a higher benefit than a single woman who has worked all her life but has earned less than her husband. Even if the benefit are the same, the single woman who worked has paid taxes on her earnings for which she gets no incremental benefit compared with the married woman who stayed at home and provided untaxed services for her family.