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The Gender Impact of Social Security Reform in Latin America

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The Gender Impact of Social Security Reform in Latin America

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Chapter 4

The Gender Impact of Social Security Reform in Latin America

Estelle James, Alejandra Cox Edwards, and Rebeca Wong

Over the past two decades many countries have adopted multipillar pension systems that include both a public DB and a private DC pillar. Critics of these pension reforms argue that the tight link between payroll contributions and benefits in the DC pillar will produce lower pensions for women. In contrast, supporters of these reforms argue that multipillar systems remove distortions that favored men and permit a more targeted public pillar that will help women. This debate is important because the majority of old people are women, pockets of poverty among the old are the largest among very old women, and pension programs affect work incentives for women.¹

To test these conflicting claims, and to analyze more generally the gender impact of alternative pension systems, this chapter examines the differential impact on genders of the new and old systems in three Latin-American countries: Chile, Argentina, and Mexico. In all three cases, the new social security system includes two mandatory components: privately managed funded individual accounts (DC) and a publicly managed and financed safety net. On the basis of household survey data, we simulate the wage and employment histories of representative men and women. These histories are used to project and compare what their pensions would be under

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This chapter is part of a joint project carried out by James, Edwards, and Wong. It was financed by the Economics and Gender Trust of the World Bank, for which we express our appreciation. It is heavily based on an earlier version—James, Edwards, and Wong (2003b)—but the tables are different. For earlier chapters coming out of this project, see Edwards (2000a, 2000b, 2001a, 2001b, 2001c, 2002), Parker and Wong (2001), and Wong and Parker (2001). For an earlier expanded version, see James, Edwards, and Wong (2003a). A much expanded version is James, Edwards, and Wong (2008).

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.

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the new systems and what they would have been under the old system rules, emphasizing the key design features that determine these gender outcomes.

Why Do Pension Systems and Reforms Have a Gender Impact?

In most public pension programs, workers receive benefits that depend on wages and years of work or more directly on their contributions. These contributory social security systems may have developed because pensions were viewed as a replacement for wages and people are more willing to pay the tax that finances the system if they receive a contingent monetary benefit in return. However, women are likely to have worked and contributed fewer years than men have and earned lower wages when working, which gives them a smaller pension. The labor market and demographic differences between men and women that affect their pensions are well known.

The labor market differences are:

- *Labor force participation rates:* Women, especially married women, traditionally have less continuous employment than do men due to the division of labor within the family. They work roughly 50–70 percent as many years as men in the three sample countries. In industrialized countries the female labor force participation rate is still 10–30 percent below that of men (Ginn, Street, and Arber 2001; OECD 2003). Even when women work, their work is usually part-time, temporary, and informal.
- *Wage levels and age-earnings profiles:* In Chile, Mexico, and Argentina, younger women earn almost as much as men, after controlling for education. However, earnings diverge with age—prime age male earnings rise 2–3 percent per year while female earnings rise 1–2 percent. This may be due, at least in part, to the fact that the experience gap between men and women increases with age. By age 50 women earn only 60–70 percent as much as men, per month worked (James, Edwards, and Wong 2003a). In countries like the UK, Canada, and Australia, women's hourly wage rates are 15–30 percent less than men's, controlling for age and education (US GAO 1997; Ginn, Street, and Arber 2001).
- *Different retirement ages:* Social security rules in many countries allow women to retire earlier than men. For example, in Chile and Argentina, women are permitted to retire five years earlier than men. These differential rules started in traditional DB systems and

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frequently continue in reformed systems—but the penalty for early retirement is greater in a DC system.

The demographic differences are:

- *Longevity*: In most countries, women at age 60 have a life expectancy that is 3–4 years greater than that of men. In Chile, a woman who retires at age 60 can expect to live 7.5 years more than her husband when he retires at age 65, on average. Thus retirement accumulation yields lower annual pensions for women, especially if gender-specific mortality tables are used for annuitization, as in Latin America. In addition, women are more likely to grow very old, by which time they have used up any voluntary savings and are therefore more likely to live in poverty.
- *Widowhood*: Women tend to be younger than their husbands yet live longer, so are likelier to become widows. (In the USA, 72% of women aged 80–84 years are widows but only 27% of men are widowers.) Hence survivor's pensions are of key importance to women. Without survivor's benefits, widows who did not work in the labor market are likely to find themselves impoverished. Even widows who have a pension of their own would find their household incomes cut by as much as 70 percent without survivor's benefits. Since household costs fall by only 35 percent when the husband dies, due to household economies of scale, widows find their income falls far more than their cost of living. Survivor's benefits fill in this gap.²

Given this background, we conjecture that recent reforms designed to link benefits more closely with contributions will produce lower own-annuities for women than for men. Partly to mitigate this effect, the new systems in Latin America contain public DB or guarantees—usually financed by general revenues—which are targeted toward low earners. We expect that these public elements will generate transfer payments that favor women, but detailed arrangements such as degree of targeting, years of work required for eligibility, retirement age, and indexation provisions dictate which women benefit and how much. The Latin-American reforms also contain elaborate restrictions at the payout stage, especially regarding annuitization, that redistribute pensions between the genders. We expect that the common requirement of survivor's benefits and joint annuities will generate an important intrafamily redistribution toward women. We measure the combined gender impact of own-annuities, public transfers, and mandatory joint pensions on monthly and lifetime benefits and redistributions.

Finally, the new systems replaced PAYGO DB systems in which contributions and benefits were only loosely linked, and women must choose

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between receiving their own benefit or the widow's benefit. 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.

Key Design Features of the Old and New Systems

With some important variations, described below, the Chilean system was emulated in Mexico and Argentina, as well as in other Latin-American countries that adopted multipillar systems. A brief discussion follows some of the features of the new systems in Chile, Mexico, and Argentina that affect gender outcomes. For more detailed descriptions of the pension systems in these countries, refer to the chapters in this volume (Arenas de Mesa et al. 2007; Rofman 2007; Sinha and de los Angeles Yañez 2007).

The new system in Chile requires a 10 percent payroll contribution to individual accounts, plus an additional 2.5–3 percent to cover administrative costs and survivor's and disability insurance (James et al. 2000; James, Smalhout, and Vittas 2001; AIOS 2005).³ Upon retirement (age 65 for men, 60 for women), workers can make gradual withdrawals from their accounts or buy an annuity that must be joint (60% to survivor) for married men. (Lump sums are very restricted.)

A minimum pension guarantee (MPG) is given to those who have contributed at least twenty years. The MPG is currently about 25 percent of the average wage, rising to 27 percent after age 70 and 29 percent after 75. If the worker's pension from private retirement saving does not reach the MPG level, the government uses general revenues to top it up. The MPG is formally indexed to prices and therefore retains a constant purchasing power. However, so far the MPG has risen faster than prices, roughly at the same pace as average wages, due to ad hoc political decisions. Because of productivity growth, wages in Chile have risen 2 percent faster than prices. De facto wage indexation of the MPG means that its purchasing power increases with wage growth over time. In the simulations below we usually assume price indexation but in some cases we show the striking difference implied by wage indexation. While we cannot know what the future holds, it will probably be somewhere between these two extremes.

In Argentina,⁴ workers contribute 11 percent of payroll, of which 2.5–3.25 percent is deducted to cover administrative costs and survivor's and disability insurance fees; we use a net investment of 7.75 percent in our simulations (James et al. 2000; James, Smalhout, and Vittas 2001; AIOS 2005).⁵ Upon retirement (age 65 for men, 60 for women), the accumulated assets are taken out in the form of gradual withdrawals, annuities (joint annuities with 70% to the survivor), or a lump sum for account balances above the specified threshold. Instead of a Chilean-type MPG, Argentina

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provides a basic 'flat' benefit that is fixed in nominal terms. It was originally financed by a payroll tax, but general revenues have now been partially substituted. The full flat benefit is paid to all eligible workers, making it much more expensive than the MPG top-up. To contain costs, eligibility is restricted to workers with at least thirty years of contributions—which excludes most women. Workers, mainly women, who reach age 70 with 10 years of contributions are granted a reduced flat pension that is 70 percent of the full benefit. Widows also inherit 70 percent of their husband's flat benefit (the 'widow's flat') when the spouse dies.

In Mexico, a contribution of 6.5 percent of payroll is made to individual accounts. Administrative fees are 1.4–1.9 percent of wages; in our simulations we use a net of 4.6 percent (James et al. 2000; James, Smalhout, and Vittas 2001; AIOS 2005). (Disability and survivor's insurance are financed by separate contribution.) Retirement income is further augmented by a 5 percent contribution of each worker's wage to a housing fund, called INFONAVIT (Instituto de Fondo Nacional de la Vivienda para los Trabajadores). If a worker does not borrow the money in the housing fund to purchase a home, it becomes part of the worker's retirement assets.⁶ During the accumulations stage, workers can choose among competing investment managers, as in Chile and Argentina. Upon retirement—at age 65 for both genders—workers choose an annuity (joint with 60% to the survivor) or gradual withdrawals spread over both spouses' lifetimes.

The state helps finance this system in three ways. First, for each day of work it pays a flat 'social quota' (SQ) to each account. The SQ was initially equal to 5.5 percent of one daily minimum wage, which was then 2.2 percent of the average wage. Since it was supposed to be price-indexed, this percentage will decline, as wages rise faster than prices over time. The SQ is designed to increase the accounts of low-income workers and their incentives to join the system. It is financed out of general revenues. Second, workers are guaranteed a minimum pension, initially equal to the minimum wage (40% of the average wage) indexed to inflation—provided they contribute for a total of twenty-four years. Third, although the new system is mandatory for new workers, those who were already in the labor force when the reforms were made can opt back into the old system on retirement. This study focuses on new workers who are not entitled to this opt-back provision.

Methodology

Analysis of how women fare relative to men in the new and old social security systems is made difficult by a number of factors. First, the new systems have not been in place long enough to be mature. That is, current

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retirees in Chile and Argentina are subjected to a mixture of old and new system benefits. We do not know what will be the benefit of someone who is fully under the new system. In Mexico almost everyone has retired under old-system rules, given the short period for accumulation and the option that current workers have to revert to the old system on retirement. Moreover, in all three countries we do not know the future rate of wage growth and rate of return on investments, on which DC benefits depend. Along similar lines, longitudinal data are not available. Thus, we could not use actual employment histories of current retirees and workers to estimate their retirement accumulations and entitlements.

We addressed 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 educational category would fare under the rules of the old and new systems, given these histories. Five educational levels are presented, ranging from incomplete primary to several years of postsecondary. The median group has full secondary education in Chile, incomplete secondary education in Argentina, and middle school education (nine years) in Mexico. 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), separately for each educational level. In reality, female labor force participation rates are strongly positively correlated with education, and educational levels have been rising dramatically over time. This means that aggregate female labor force participation rates will also rise over time. Changing social norms are leading to additional increases in female employment probabilities within each educational category. Moreover, the work incentives and disincentives in the new pension systems may alter work habits, so participation rates may be endogenous. To the degree that rising labor force participation rates are due to increased education, the numbers will remain constant within educational grouping even if the aggregate numbers shift. Our analysis of the relationship between women’s education and labor force participation rates over time indicates that one-third to one-half of the aggregate increase is due to changes in educational composition of the population and the remainder is due to other factors (James, Edwards, and Wong 2008).

These potential changes in age-specific female labor force participation rates were not taken into account directly. However, in addition to the ‘average’ woman with average work experience in each educational group, we also calculated pensions for ‘ten-year women’, women who worked only ten years (prior to childbearing), and ‘full-career women’, women who

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had the same labor force participation and retirement age as men. Today's younger workers will probably look more like the full-career women when they retire due to educational shifts and increased work propensities for other reasons. The absence of longitudinal or retrospective data means that we could not estimate wages as a function of experience, so the lifetime earnings and pensions of full-career women are probably understated.

The 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 3 years older than the wife. The data are not adequate to model pensions of the small proportion of women who remain single throughout their lifetimes. However, the analysis of their work patterns indicates that singles work 50–100 percent more than married women. Thus, our simulations for full-career women may give us a rough approximation of the lifetime earnings and benefits of single women.

Data

We seek to analyze the retirement incomes of women covered by the social security system. (Many women do not work in the formal labor market and hence are not covered by the formal social security system.) In constructing our synthetic men and women, we used national household surveys for urban areas for 1994 (Chile), 1996 (Argentina), and 1997 (Mexico).⁷ These data do not coincide precisely with groups that are actually covered by the social security system. While most social security affiliates live in urban areas, some live in rural areas, and some urban residents are not covered by social security. In Chile, the wage and work data primarily cover full-time workers who contribute. The Chilean data allow us to identify social security affiliates and the contributing behavior of affiliates. However, in Argentina and Mexico the data cover full-time plus part-time workers, affiliates plus nonaffiliates. Since many of these are not in the social security system, our data may understate wages and work of women who were covered by social security in these countries. Operating in the opposite direction, we attributed all working time as contributing time, but we know that some part of this work is outside the formal labor sector and social security system, in which case our data would overestimate lifetime contributions, annuities, and eligibility for the public benefit. While our object is to characterize the behavior of men and women who are affiliated with social security and contribute when they work, it is important to remember that a substantial portion of individuals are not affiliated, and many do not contribute much of their working time even if they are—the problem of low density of contributions. We return to this problem later on.

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Simulations

In the following sections, we use these employment histories to simulate the accumulations, annuities, and public benefit entitlements that different groups of men and women can expect under the new systems. We simulate the case of young workers, entering the labor market currently and retiring 40–45 years later. Accumulations and annuities under DC 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 economywide real wage growth is 2 percent per year and the real rate of return on investments, net of administrative fees, is 5 percent prior to retirement. (The actual return has been much higher than this so far—for example, it has averaged over 10% real in Chile since the start of the system—but these high rates are unlikely to continue in the long run.) The return during the payout stage is assumed to be 3.5 percent, given the likelihood that many will choose a lower risk fixed-rate annuity (see James and Song 2001; James and Vittas 2001).

Sensitivity analyses assuming a 3 percent real rate of return during the accumulation stage, 1.5 percent during annuitization, and a 0 percent rate of wage growth were also carried out. The gender differentials in this ‘slow growth’ case were very similar to the baseline, except that the relative role of the public benefit increases dramatically. The tables in this chapter show only the baseline case. (For details on the slow growth case, see James, Edwards, and Wong 2003*a*, 2003*b*, and 2008.) Severe portfolio restrictions in Latin America ensure that rates of return will be similar for all workers. If yields were lower for women because they tend to choose a risk-averse portfolio, this would lead to a lower gender ratio.⁸ Finally, throughout this analysis we abstract from inflation. As is discussed briefly below, this probably leads us to understate the gender improvement from the new system.

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 on retirement. We derive the annuity payouts by dividing the projected accumulation by relevant annuity factors, which depend on the interest and mortality rates. We use World Bank mortality tables that include expected longevity improvement factors for the cohort retiring in 2040, which is the approximate year when young workers today will retire. Gender-specific tables are used by insurance companies in the three countries and by our analysis. These data do not allow us to differentiate longevity by educational or income level, which leads us to overestimate lifetime system progressivity. Men and women are assumed to retire at the age that is specified in each country. In reality, we know that early retirement is common for both genders, which will reduce the size of pension though not necessarily

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the gender differential. While we start by comparing monthly benefits, to analyze transfers from different sources we shift to a comparison of lifetime benefits, since retirement age and expected age of death vary by gender and country and benefits from the joint annuity start flowing to widows in very old age.⁹

The Old System Counterfactual

We start out by analyzing only the new systems, then move on to compare the gender impact of the new and the old systems. This approach introduces an additional set of methodological problems. The old systems were actuarially unbalanced and so could not have delivered their promised benefits. In the long run, all these countries faced the prospect of raising taxes (which were difficult to collect) and/or reneging on their pension promises. Chile was facing financial insolvency even in the short term, and Argentina was already defaulting on payments to retirees. Given this uncertainty regarding benefit payments in the old system, what is the counterfactual to the new system?

We avoid this problem by applying the DB formulas in place just before the reform and by focusing on relative positions rather than absolute gains and losses to different gender-education-marital groups. We thus abstract from efficiency effects that might lead everyone to be better or worse off. We ask: which groups gained or lost the most in relative terms from the reform? Did gender ratios improve or deteriorate? Implicitly, this means our counterfactual is any system in which the fiscal adjustment to the pre-existing insolvency is distributionally neutral—involving equiproportional benefit cuts or tax increases for each group. We compare the new system with this counterfactual.

Retirement Income for Women versus Men in the New System

Using the methodology just described, we estimate the monthly and lifetime benefits representative women and men would receive from private annuities, public benefits, and intrahousehold transfers. All monetary values have been converted to 2002 US dollars. (For Argentina, this exchange rate was about one-third of the rate that obtained during our study period prior to the country's fiscal crisis.)

Income from Women's Own-Annuities

To simplify, we assume here that all workers retire at the legal retirement age: 60 for women in Chile and Argentina, 65 for women in Mexico,

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and 65 for men in all three countries. Women with ‘average’ employment experience receive annuities that are only 30–50 percent those of men with similar education because of their lower lifetime work and wages and earlier retirement. The lower benefits for women are partly because of their earlier allowable retirement age in Chile and Argentina. Few women postpone taking their pension beyond age 60, possibly because they do not realize the large difference in the pension amount that would accrue. If women in Chile and Argentina delayed pensioning until age 65, they would collect interest for 5 more years and their annuities would cover 5 fewer years. Tables 4-1a and 4-1b and Figures 4-1a, 4-1b, and 4-1c show that their accumulations would increase by 25–30 percent and their monthly pensions by almost 50 percent, and the gender ratio would narrow substantially. The increase would be even larger if they worked and contributed during this period. The equal retirement ages for men and women in Mexico is the main reason why female/male ratios of annuities are projected to be higher than in Argentina and almost as high as in Chile, despite the relatively lower wages and work histories of Mexican women.

The monthly annuities of ‘full-career women’, who work as much as men, are higher than those of average women but only 60–75 percent as large as those of men. The remaining difference is due to the lower wage that women have received and the smaller contributions they have therefore made.

TABLE 4-1a Simulated Future Monthly Annuities from Individual Accounts
(Based on 5% Real Return in Accumulation Stage, 3.5% in Annuity Stage, 2% Real Wage Growth, Data in 2002 US\$)

<i>Chile</i>					
	<i>Incomplete Primary</i>	<i>Incomplete Secondary</i>	<i>Complete Secondary</i>	<i>Up to 4 Post Secondary</i>	<i>5+ yrs Post- Secondary</i>
<i>Average married males, RA = 65</i>					
Annuity	\$179	\$259	\$386	\$538	\$1,240
<i>Females</i>					
Average women, RA = 60	\$59	\$83	\$146	\$241	\$444
Average woman if RA = 65	88	121	213	351	661
Full-career woman, RA = 65	136	183	297	408	702
10-year woman, RA = 60	36	42	55	87	140

(cont.)

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TABLE 4-1a (Continued)

<i>Argentina</i>					
	<i>Incomplete Primary</i>	<i>Incomplete Secondary</i>	<i>Complete Secondary</i>	<i>Some Post- Secondary</i>	<i>University Degree</i>
<i>Average married males, RA^a = 65</i>					
Annuity	\$153	\$233	\$349	\$362	\$701
<i>Females</i>					
Average woman, RA = 60	\$32	\$46	\$91	\$127	\$248
Average woman if RA = 65	47	67	132	185	360
FC, ^b RA = 65	101	140	228	238	414
10-year, ^c RA = 60	22	33	42	52	87
<i>Mexico</i>					
	0–5	6–8	9	10–12	13+
<i>Average married males, RA = 65</i>					
Annuity	\$267	\$310	\$381	\$481	\$822
<i>Females, RA = 65</i>					
Average woman	\$78	\$93	\$123	\$199	\$407
FC woman	162	201	247	362	558
10-year woman	47	51	61	86	125

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology. WB gender-specific mortality tables for cohort retiring in 2040 are used to generate actuarial factors for annuity pricing.

Notes: Joint annuity payouts are given for married men and women in Argentina and Mexico, individual annuities for women in Chile, as required by law. Wives are assumed to be three years younger than their husbands. World Bank gender-specific mortality tables for each country for cohorts retiring in 2040 are used to generate actuarial factors. Wives have three to four years greater longevity than their husbands. MPG in Chile, flat benefit in Argentina, and annuity from the social quota (SQ) in Mexico are not included in this table.

^aRA: Retirement age.

^bFC: Full-career woman with same labor force participation rate as men.

^c10-year woman: Works for ten years, prior to having children.

Women with higher education have higher labor force participation rates than do others, making them more like full-career women. However, they continue to be adversely affected by their lower retirement age, and the wage gap tends to increase for women with the highest education. As a result, female/male pension ratios increase with educational level, until the top level, when they typically fall.

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TABLE 4-1b Female/Male Ratio of Simulated Monthly Annuities from Individual Accounts (in Percentages) (Based on 5% Real Return in Accumulation Stage, 3.5% in Annuity Stage, 2% Real Wage Growth, Data in 2002 US\$)

<i>Chile</i>					
	<i>Incomplete Primary</i>	<i>Incomplete Secondary</i>	<i>Complete Secondary</i>	<i>Up to 4 post-Secondary</i>	<i>5+ years Post-Secondary</i>
<i>Average married males, RA = 65</i>					
Annuity	100	100	100	100	100
<i>Females</i>					
Average women, RA = 60	33	32	38	45	36
Average woman if RA = 65	49	47	55	65	53
Full-career woman, RA = 65	76	71	77	76	57
10-year woman, RA = 60	20	16	14	16	11
<i>Argentina</i>					
	<i>Incomplete Primary</i>	<i>Incomplete Secondary</i>	<i>Complete Secondary</i>	<i>Some Post-Secondary</i>	<i>University Degree</i>
<i>Average married males, RA = 65</i>					
Annuity	100	100	100	100	100
<i>Females</i>					
Average woman, RA = 60	21	20	26	35	35
Average woman if RA = 65	31	29	38	51	51
FC, RA = 65	66	60	65	66	59
10-year, RA = 60	14	14	12	14	12
<i>Mexico</i>					
	0-5	6-8	9	10-12	13+
<i>Average married males, RA = 65</i>					
Annuity	100	100	100	100	100
<i>Females, RA = 65</i>					
Average woman	29	30	32	41	49
FC woman	61	65	65	75	68
10-year woman	18	17	16	18	15

Source: Calculations by authors. See Table 4-1a for definitions and methodology.

Notes: The female/male ratio is the ratio of annuities of female to male in the same educational and marital categories.

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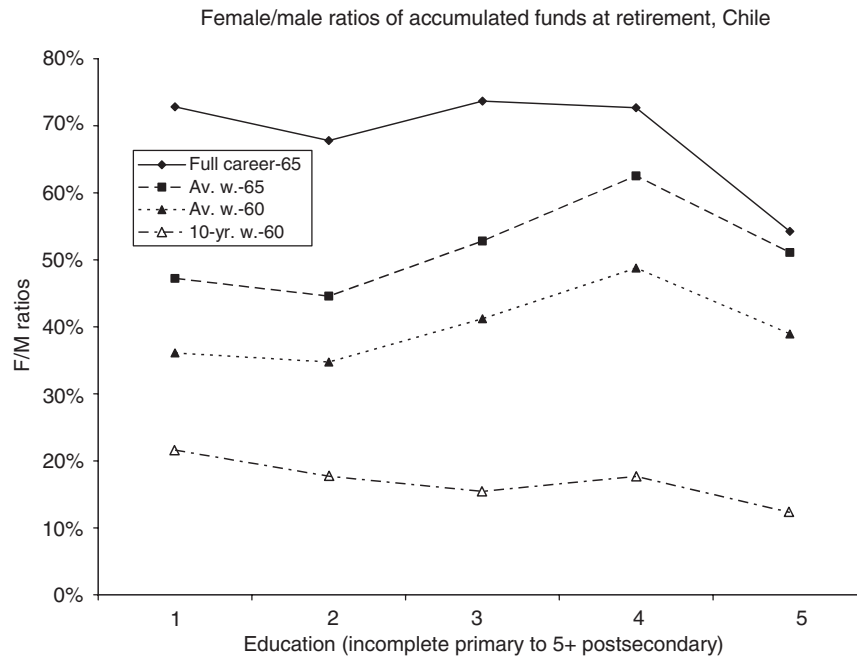


Figure 4-1a. More work and postponed retirement increase female/male ratios of accumulations (Chile).

Income from the Public Benefit

As discussed above, the MPG in Chile, the flat benefit and widow's flat benefit in Argentina, and the SQ in Mexico provide a public benefit that goes disproportionately to low earners. These public benefits raise the total pension of low earners by a much higher percentage than that of high earners, which also means they raise the pensions of women proportionately more than men (Table 4-2). However, the precise effect on women depends on the design of the benefit.

In Chile, if the MPG is price-indexed (as it is formally), it raises the total monthly pension of the average woman who has not completed primary school by 31 percent (Figure 4-2a). Average women in higher educational categories do not receive this benefit, nor do full-career women, because their own-annuity is projected to be above the MPG floor. (For the same reason very few men are projected to receive the public benefit.) Its impact is quite small because a price-indexed MPG that is 25 percent of the average wage today will be only 12 percent by the time today's young workers retire. Because the MPG is currently about double the official poverty line, it will keep all eligible women out of poverty—but it will not help any except the

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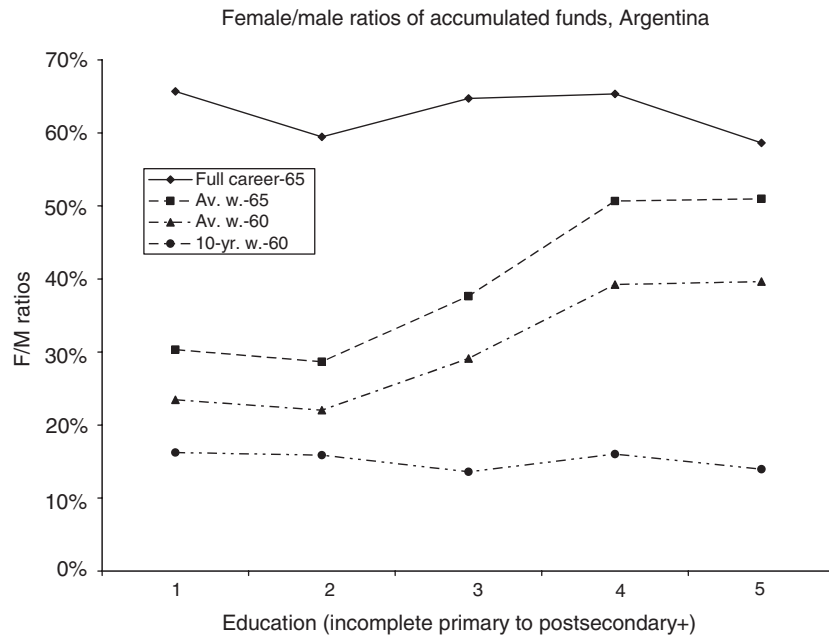


Figure 4-1b. More work and postponed retirement increase female/male ratios of accumulations (Argentina).

lowest earners, it becomes less relevant as it falls further behind the average wage in the economy, and it costs very little.

On the other hand, if the MPG is wage-indexed (as it has been de facto, by political decisions), the story is quite different. With expected wage growth of 2 percent yearly, the MPG will more than double over the working life of today's young worker. Because it grows at the same rate as wages, it remains at 25–29 percent of the average wage. In this scenario, most women (even some full-career women and some men) are likely to receive some MPG top-up. For women with average work histories in the bottom educational category, a wage-linked MPG will almost triple their own-annuities and bring their total retirement income very close to that of their male counterparts. Of course, this increased size of and access to the MPG raises its fiscal cost substantially. Thus the choice between wage- and price-indexation is crucial, as it determines its costs and benefits and how these change for future cohorts. In the discussion below we assume price-indexation, unless wage-indexation is explicitly mentioned. Doing so biases our results against women, whose relative position will improve if the wage linkage continues.

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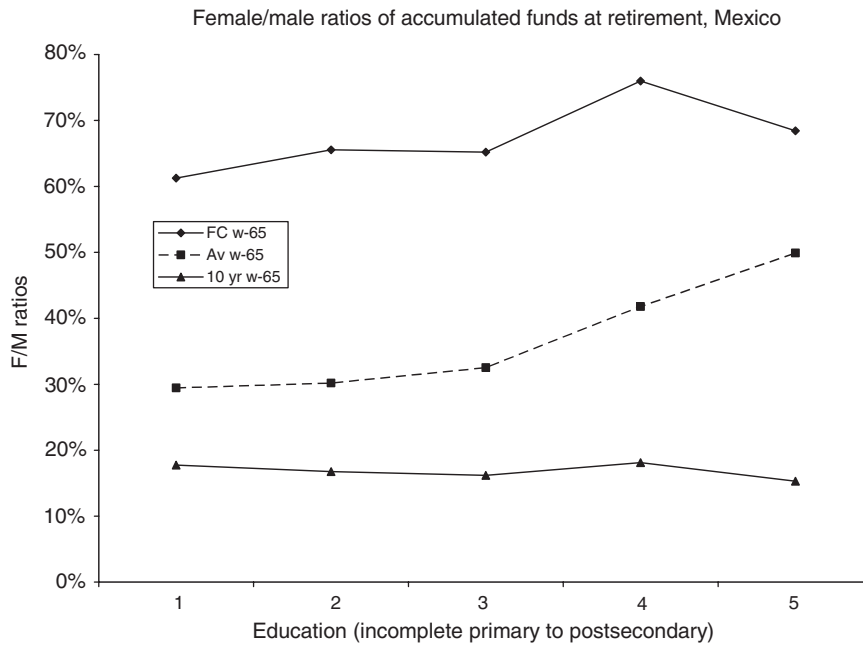


Figure 4-1c. More work increases female/male ratios of accumulations (Mexico).

Whether it is price- or wage-indexed, the MPG does not provide income to high earners. (In this sense, it is more narrowly targeted toward low earners and women than is Argentina's flat benefit or Mexico's SQ.) If it is price-indexed, it narrows the gender gap at the bottom but does nothing at the top or in the middle.

Twenty years of contributions are required to be eligible for the MPG. Although some women do not meet this criterion,¹⁰ the average woman in all educational categories does. Moreover, low-earning women will be encouraged by the MPG to work twenty years even if they did not plan to do so otherwise—but they are discouraged from working marginally more than twenty years because if their own-annuity increases, their public benefit will decrease commensurately. Likewise, low-earning women are unlikely to work past the normal retirement age, once they meet the twenty-year requirement. The incentive for strategic manipulation is greater if the MPG is wage-indexed. An MPG that rises for each year of work would prevent some of these moral hazard problems.

In Argentina, by contrast, most men who contribute when they work are eligible for the flat public benefit and receive it regardless of income.¹¹ Although most women work fewer than the 30 years required for full

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TABLE 4-2 Projected Impact of Public Benefits on Monthly Pensions (2002 US\$)

Education	1	2	3	4	5
<i>Chile</i>					
<i>Married Men</i>					
Annuity, RA = 65	\$179	\$259	\$386	\$538	\$1,240
% increase-MPG	0	0	0	0	0
<i>Women with average work histories</i>					
Annuity, RA = 60	\$59	\$83	\$146	\$241	\$444
Annuity + MPG if price-indexed	\$78	\$83	\$146	\$241	\$444
Annuity + MPG if wage-indexed	\$172	\$172	\$172	\$241	\$444
% incr.-MPG price-indexed	31	0	0	0	0
% incr.-MPG wage-indexed	192	107	18	0	0
<i>Average female/male ratios (%)</i>					
Own-annuity	33	32	38	45	36
Annuity + MPG if price-indexed	44	32	38	45	36
-if wage-indexed	96	66	45	45	36
<i>Argentina</i>					
<i>Married men</i>					
Annuity, RA = 65	\$153	\$233	\$349	\$362	\$701
Annuity + flat	\$230	\$310	426	439	778
% increase by flat	50	33	22	21	11
<i>Women with average work histories</i>					
Annuity, RA = 60	\$32	\$46	\$91	\$127	\$248
Annuity + flat	\$86	\$100	\$145	\$181	\$325
% incr. by flat	169	118	60	43	31
<i>Average female/male ratios (%)</i>					
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
<i>Mexico</i>					
<i>Married men</i>					
Own-annuity, no SQ	\$267	\$310	\$381	\$481	\$822
Annuity incl. SQ	\$364	\$407	\$478	\$573	\$909
% increase by SQ	36	31	25	19	11
<i>Women with average work histories</i>					
Own-annuity, no SQ	\$78	\$93	\$123	\$199	\$407
Annuity incl. SQ	126	141	177	260	477
% incr. by SQ	62	52	44	30	17
<i>Average female/male ratios</i>					
Annuity if no SQ (%)	29	30	32	41	49
Annuity incl. SQ (%)	35	35	37	45	53

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology.

Notes: See Table 4-1a for definition of the five education categories and other notes. The MPG is converted to actuarially equivalent monthly top-up. In Argentina average women in the bottom four educational groups receive a reduced flat benefit at age 70 while in the top education group, they work enough to receive the full flat at age 65, and the flat benefit is treated as if it is price-indexed (although it is not). SQ = social quota.

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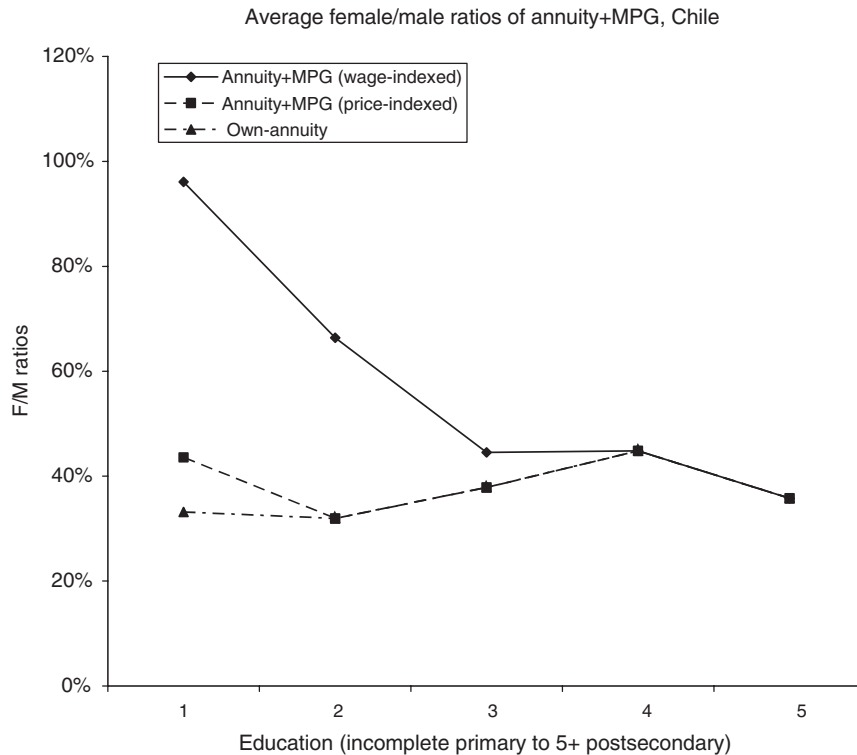


Figure 4-2a. Wage-indexed MPG: larger and broader impact than price-indexed MPG (Chile).

eligibility, they get a reduced flat benefit beginning at age 70 if they have worked 10 years. This situation exemplifies the importance of eligibility conditions in determining the gender impact. Even though the reduced flat benefit for women is a smaller absolute amount than it is for men, it is a much larger increment to women's own-annuity, and more than doubles the pensions of women with primary and partial secondary education. Women with a university degree and full-career women work long enough to get the full flat benefit at age 65 (see Figure 4-2b). Additionally, married women inherit 70 percent of their husbands' flat benefit.

Because the flat and widow's flat benefit are partially financed by a tax on wages, the fact that men earn more than women but get a smaller benefit compared with their wages means that women get a positive net transfer. The largest net transfer goes to women who work only ten years. (For further discussion of imputed taxes and net benefits, see James, Edwards,

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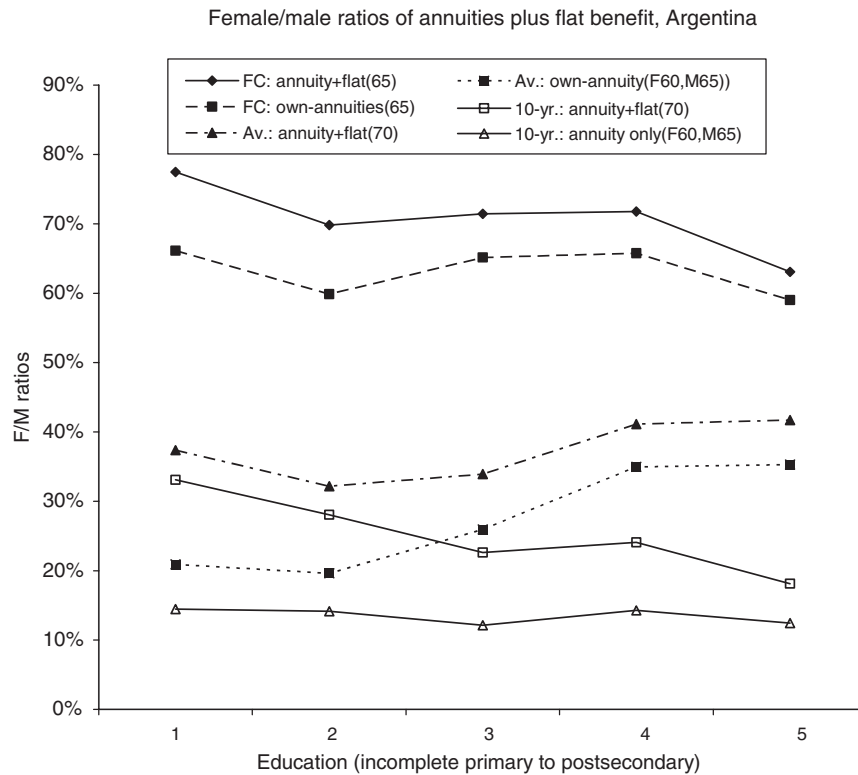


Figure 4-2b. Large % increment to 10-year women and low earners from flat benefit in Argentina.

and Wong 2003*a*, 2003*b*, and 2008.) This large benefit for ten-year women makes the Argentine public benefit much like a noncontributory scheme. On the one hand, this transfer provides retirement income to older women who otherwise would have few resources of their own and keeps them out of poverty. On the other hand, it also goes to middle-class women who are far from the poverty line. Moreover, the benefit may discourage market work among women and in the long run make them less financially independent.

Finally, Mexico's SQ adds a flat amount to every worker's account for each day worked: 5.5 percent of the minimum wage. While the public benefits in Chile and Argentina are financed on a PAYGO basis, which may imply a large hidden liability for government, Mexico's SQ is prefunded, paid into workers' accounts long before they retire, and invested by the worker with his or her own contributions.

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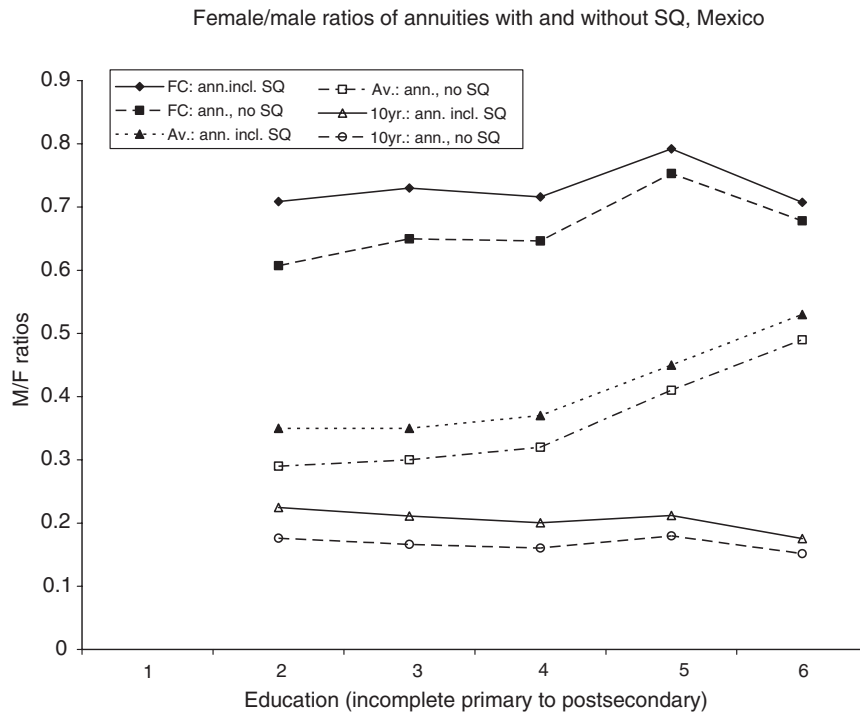


Figure 4-2c. Larger impact of SQ for low earners who work more in Mexico.

The daily size of the SQ is uniform, so the percentage increment to pensions falls for high earners, as in Chile and Argentina. It adds 45–60 percent to the annuities of women with primary or partial secondary education but only 25–35 percent to counterpart men. Women with some university education get a larger total SQ (because they work more) but a smaller percentage increment to their own pensions (Figure 4-2c). Because Mexico's SQ gives an extra benefit for every day of work, it is less tilted toward women than is Argentina's flat benefit, but it encourages work by women more than do Chile's and Argentina's public benefits.

Mexico also offers an MPG for those with twenty-four years of contributions. Initially the MPG was 40 percent of the average wage—a relatively high minimum. However, because it is price-indexed, it will fall to less than 20 percent by the time today's young workers retire. Since most low-earning women work in the formal sector fewer than twenty-four years, and most men will have own-annuities that exceed the MPG floor, our projections indicate that it will have little impact—if it remains price-indexed. The choice between a twenty-year eligibility rule as in Chile and a twenty-four-

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year rule as in Mexico turns out to be crucial for women, given their current labor force behavior.

Income from Joint Annuities

The gender gap in retirement income from women's own-annuities is offset further by joint annuities (or widow's benefits) that husbands are required to provide for their surviving wives. In Chile and Mexico, the widow gets 60 percent of the husband's annuity amount; in Argentina, 70 percent. The husband pays for this by getting a smaller payout initially. These intrahousehold transfers are an important part of the new systems. They can be viewed as a formalization of the informal family contract, in which men agree to provide monetary support to their wives in return for nonmonetary household services and partial withdrawal from the labor market. Some men may be myopic and fail to arrange for continuing to support their wives after their deaths (Bernheim et al. 2001). The joint annuity requirement is a way to enforce this contract. When the wife is 3 years younger than her husband, joint annuities pay him 17–21 percent less per month than individual annuities, while doubling or tripling the monthly pension that the average widow will receive (see Table 4-3).

The joint annuity is especially important because a widow's cost of living is estimated to be roughly 70 percent that of a couple's cost due to household economies of scale. The widow's benefit plus her own benefit maintains her purchasing power at 70–80 percent of the previous household level, so her standard of living is unchanged when her husband dies. The joint annuity requirement also applies to unmarried mothers of the worker's children. It protects women who did not work at all in the formal market and augments the income of those who did. It does not, of course, protect single, unattached women.

Additionally, since her husband rather than the public treasury has paid for the joint annuity, the widow can keep her own annuity when she gets the survivor's benefit, in contrast to the previous systems in Chile, Argentina, and many other countries. Since women got little or no benefit from their own contributions, their participation in the labor market was penalized and discouraged in many old DB systems. Under the new systems, the treatment of the joint annuity encourages work.

It is also worth noting that, with joint annuities, pensions are similar whether gender-specific or unisex mortality tables are used (James, Edwards, and Wong 2003*b*, 2008). Regarding the purchase of individual annuities, unisex mortality tables produce 7–9 percent higher payouts for women and lower payouts for men compared to gender-specific tables, but with joint annuities this choice of mortality tables makes little difference because joint annuity pricing takes into account the combined lifetimes

108 Estelle James, Alejandra Cox Edwards, and Rebeca WongTABLE 4-3 The Impact of Joint Annuities ($r = 5\%$ during Accumulations, 3.5% during Annuity Stage, Real Wage Growth = 2% , 2002 US\$)

<i>Education</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Chile</i>					
<i>Males, retiring at 65</i>					
Individual	\$217	\$314	\$467	\$651	\$1,501
Joint	179	259	386	538	1,240
<i>Females, retiring at 60</i>					
Individual	\$59	\$83	\$146	\$241	\$444
Widow's benefit	107	156	232	323	744
Widow's pensions as % of H + W pensions	70	70	71	72	71
<i>Argentina</i>					
<i>Males, retiring at 65</i>					
Individual	\$194	\$296	\$443	\$459	\$889
Joint	153	233	349	362	701
<i>Females, retiring at 60</i>					
Individual	\$34	\$48	\$96	\$134	\$261
Joint	32	46	91	127	248
Widow's benefit	107	163	244	253	491
Widow's pensions as % of H + W pensions	78	77	78	79	79
<i>Mexico</i>					
<i>Males retiring at 65</i>					
Individual	\$448	\$501	\$589	\$705	\$1,120
Joint	364	407	478	573	909
<i>Females retiring at 65</i>					
Individual	\$133	\$148	\$187	\$273	\$502
Joint	126	141	177	260	477
Widow's benefit	218	244	287	344	545
Widow's pensions as % of H + W pensions	70	70	71	72	74

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology.

Notes: See Table 4-1a for educational categories. The MPG and flat benefit are not included in this table. SQ is included, since it is part of annuity. In Chile husbands must purchase joint annuities and wives purchase individual annuities. In Argentina and Mexico, both spouses must purchase joint annuities. Joint annuity assumes 60% to survivor (70% in Argentina). Husbands and wives are assumed to belong to same educational group. The last row for each country gives full public + private pensions of wife after husband dies relative to total pensions of husband + wife while husband was alive. *H + W pensions* means total pensions of husband + wife.

of husband and wife. In this way, the joint annuity requirement defuses the sometimes controversial issue of whether to require unisex tables. This applies only to married couples or registered partners; the issue remains important for single men and women.

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Total Lifetime Pension from Own-Annuity, Public Benefit, and Joint Annuity

The discussion now shifts to total lifetime rather than monthly benefits because the widow's benefit and Argentina's reduced flat benefit start at a much later age than benefits based on own earnings. Moreover, the retirement age for women in Chile and Argentina is earlier than that for men and for Mexican women (the normal retirement age sometimes changed as part of the reform). To compare benefits across subgroups, countries, and time, therefore, it is necessary to calculate their expected present value, taking into account life expectancy and age when the benefit starts. Expected present value of lifetime benefits is measured as of age 65 using a 3.5 percent discount rate (the rate of return on annuities) and World Bank gender-specific mortality tables for each country. In general, lifetime gender ratios are higher than monthly ratios because women live longer than men and, in Chile and Argentina, retire earlier. Also, in general, lifetime gender ratios are higher for low educational categories because of the equalizing effect of the public benefit and the relatively greater compound interest earned by workers with flat age-earnings profiles.

The addition of the public benefit and joint annuity bring the present value of lifetime benefits for women much closer to that of men than does the own-annuity alone. Among women with an average work history, the public benefit adds 20–80 percent to lifetime income stemming from their own-annuity, and the joint annuity adds another 40–100 percent (Figures 4-3 and 4-4 and Table 4-4). The joint annuity more than doubles lifetime retirement income for ten-year women who did little market work. In general, the joint annuity is larger than the public benefit.

Taking into account all 3 income sources, the lifetime retirement income of the average married woman is 65–95 percent that of average men with similar education (even higher in Chile if it continues to wage-link its MPG). This ratio becomes 100 percent or more for full-career married women—working longer and retiring later has the largest impact of all. Of course, single women do not get the joint annuity. Therefore, their female/male ratios are much lower (Tables 4-4 and 4-5, Figures 4-5a, 4-5b, and 4-5c).

While these generalizations hold for all three countries, formal labor force attachment is rewarded differentially in each case. The own-annuity rises with incremental work in each country. However, very different patterns apply to the public benefit. In Chile, only average women in the lowest educational groups, who retire early with about twenty years' experience, will get a public benefit. Neither ten-year women, full-career women, women who postpone retirement, nor highly educated women who work more get the MPG. In Mexico, by contrast, full-career women get the largest

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% increment to EPV from public benefit: men vs women, high vs low earners

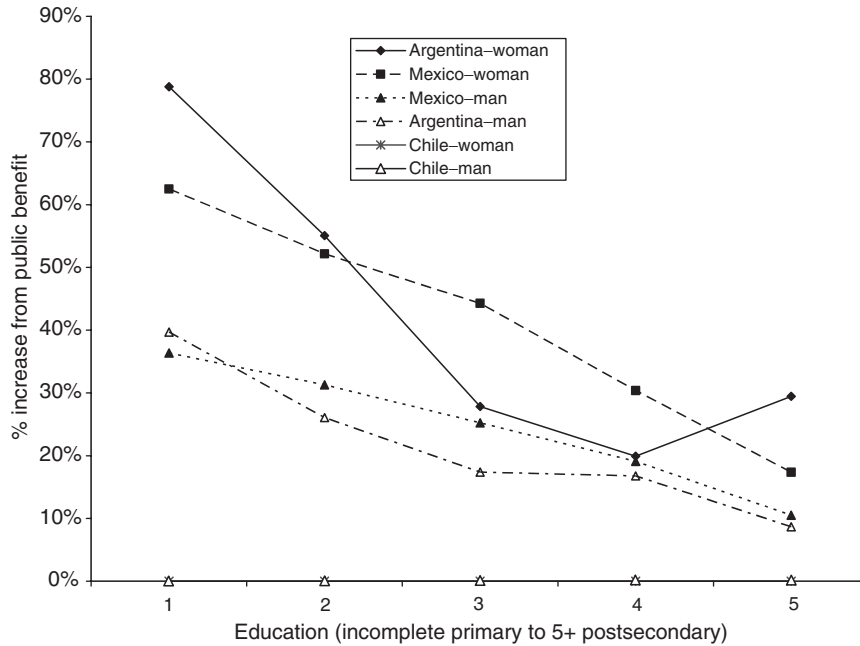


Figure 4-3. Women and low earners get largest % increment to EPV from public benefit. *Note:* EPV = expected present value.

public benefits, ten-year women the smallest. In Argentina, a substantial benefit and net subsidy go to women who work only ten years. A high implicit tax rate must be imposed on high-earning men and full-career women to finance these benefits. Even without taking account of these taxes, the ratio of benefits received by a full-career or an average woman relative to a ten-year woman is much higher in Mexico than in Argentina. The lower payoff in Argentina may discourage women from market work. In contrast, for Chile the minimal size of the public benefit means that the higher work incentive of the private annuity dominates (Figure 4-6).

Women's Benefits Relative to Men Before and After Reform

Because of uncertainty regarding future benefit levels under the old insolvent systems, we cannot compare the absolute dollar values of the benefits women would have received under the old systems to those under the new.

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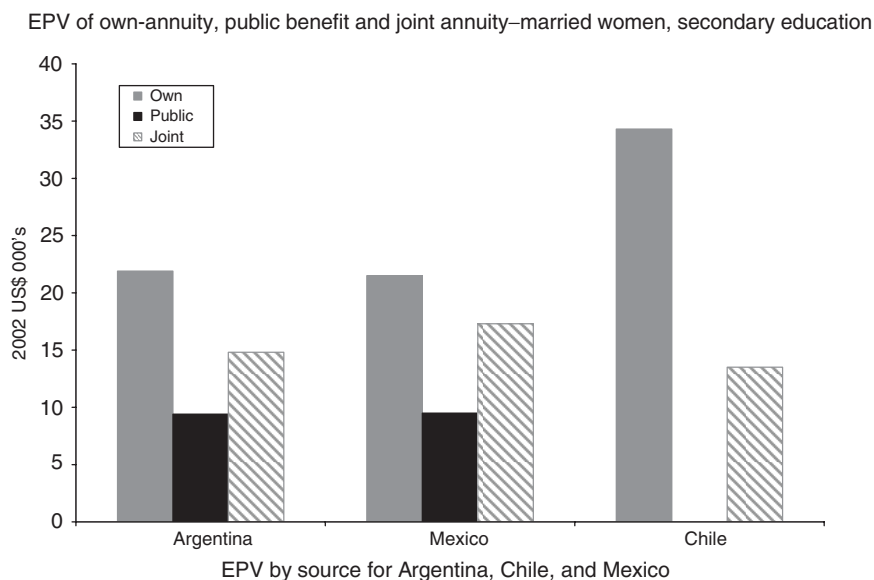


Figure 4-4. Joint annuity adds more than public benefit to EPV of average woman.
Note: EPV = expected present value.

However, we can compare the female/male ratios of benefits before and after reform, under the assumption that the counterfactual would have had the same distributional effects as the original system (see the section on methodology above). We therefore ask: (a) Did the gender gap in pensions get larger or smaller in the process of the reform?, and (b) which subgroups of women (and men) gained or lost the most? We find that, in general, the gender ratio is projected to improve because of the reform, and the greatest relative gains will be received by low-earning married women (and single men). Full-career women gained more than did ten-year women in Chile and Mexico, consistent with their emphasis on work incentives, but ten-year women gained more in Argentina (Figures 4-7a, 4-7b, and 4-7c).

A Priori Expectations about the New versus the Old Systems

The old systems provided DB according to a formula that depended on wages and years of contributions. In general, the formula gave generous benefits to workers who contributed for only ten years and then withdrew from the labor market; these workers were disproportionately women.¹² Married women got a widow's benefit that was 50 percent of their husband's pension in Chile, 75 percent in Argentina, and 90 percent in Mexico.

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TABLE 4-4 Present Value of Lifetime Annuity, Joint Annuity, and Public Benefit
($r = 5\%$ during Accumulation, 3.5% Discount Rate after Retirement,
Real Wage Growth = 2% ; in 2002 US\$ (1,000s))

<i>Education</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Chile</i>					
<i>Average man</i>					
Individual annuity	\$32.4	\$46.9	\$69.9	\$97.4	\$224.4
Cost of joint annuity (if married)	-5.6	-8.2	-12.2	-16.9	-39.0
<i>Average woman</i>					
Own-annuity	\$13.9	\$19.4	\$34.3	\$56.5	\$104.0
MPG (if price-indexed)	3.1	0	0	0	0
MPG (if wage-indexed)	18.5	14.6	4.3	0	0
Joint annuity received (if married)	6.3	9.1	13.5	18.8	43.3
% incr. from MPG (price-indexed)	22	0	0	0	0
% incr. from MPG (wage-indexed)	133	75	13	0	0
% incr. from joint annuity	45	47	39	33	42
<i>Full-career woman</i>					
Own-annuity	\$23.6	\$31.8	\$51.5	\$70.8	\$121.7
% incr. from joint annuity	27	28	26	27	36
<i>10-year woman</i>					
Own-annuity	\$8.3	\$9.9	\$12.9	\$20.5	\$32.8
% incr. from joint annuity	75	92	105	92	132
<i>Argentina</i>					
<i>Average man</i>					
Individual annuity	\$27.7	\$42.2	\$63.2	\$65.5	\$126.9
Flat	11.0	11.0	11.0	11.0	11.0
Cost of joint annuity (if married)	-5.8	-8.9	-13.3	-13.8	-26.7
% incr. from flat	40	26	17	17	9
<i>Average woman</i>					
Own-annuity	\$7.7	\$11.0	\$21.9	\$30.5	\$59.7
Flat	6.1	6.1	6.1	6.1	17.6
Widow's flat	3.3	3.3	3.3	3.3	3.3
Joint annuity received (if married)	6.5	9.9	14.8	15.3	29.6
% incr. from flat	79	55	28	20	29
% incr. from widow's flat	42	29	15	11	5
% incr. from joint annuity	84	89	68	50	50
<i>FC woman</i>					
Own annuity	\$18.2	\$25.1	\$40.9	\$42.8	\$74.4
Flat	13.0	13.0	13.0	13.0	13.0
% incr. from flat	71	52	32	30	17

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TABLE 4-4 (Continued)

<i>Education</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
% incr. from widow's flat	18	13	8	8	4
% incr. from joint annuity	36	39	36	36	40
<i>10-year woman</i>					
Own-annuity	\$5.3	\$8.0	\$10.2	\$12.5	\$21.0
Flat	6.1	6.1	6.1	6.1	6.1
% incr. from flat	120	81	63	51	31
% incr. from widow's flat	64	43	34	28	16
% incr. From joint ann.	128	131	153	130	149
<i>Mexico</i>					
<i>Average man</i>					
Individual annuity, no SQ	\$46.2	\$53.7	\$66.1	\$83.3	\$142.5
SQ	16.8	16.8	16.7	16.0	15.0
Cost of joint annuity (if married)	-11.9	-13.3	-15.6	-18.7	-29.7
% increase from SQ	36	31	25	19	11
<i>Average woman</i>					
Own-annuity if no SQ	\$13.6	\$16.2	\$21.5	\$34.8	\$71.1
SQ to own-account	8.5	8.5	9.5	10.6	12.3
Joint annuity (if married)	13.2	14.7	17.3	20.7	32.9
% incr. from SQ	62	52	44	30	17
% incr. from joint annuity	97	91	80	60	46
<i>Full-career woman</i>					
Own-annuity if no SQ	\$28.3	\$35.2	\$43.1	\$63.3	\$97.5
SQ	16.8	16.8	16.7	16.0	15.0
% incr. from SQ	59	48	39	25	15
% incr. from joint annuity	46	42	40	33	34
<i>10-year woman</i>					
Own-annuity if no SQ	\$8.2	\$9	\$10.7	\$15.1	\$21.8
SQ	6.1	6.0	6.0	6.1	6.1
% incr. from SQ	74	67	56	41	28
% incr. from joint annuity	160	164	162	137	151
<i>Rewards for work in 3 countries:</i>					
<i>Benefits to full-career/10-year woman</i>					
<i>Public benefit + own-annuity (percentage)</i>					
Chile	283	322	401	346	371
Argentina	231	236	287	267	294
Mexico	315	346	357	374	403
<i>Public benefit (percentage)</i>					
Chile ^a					
Argentina	174	174	174	174	174
Mexico	275	278	277	262	245

(cont.)

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TABLE 4-4 (Continued)

Education	1	2	3	4	5
<i>Public benefit: Average/10-year woman (percentage)</i>					
Chile ^a					
Argentina	100	100	100	100	223
Mexico	140	140	158	173	202

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology.

Notes: For educational categories see Table 4-1a. Married full-career and 10-year women get the same joint annuity and other widow's benefits as do average women, but these benefits constitute different percentages of their own-annuity.

^a Full-career and 10-year women in Chile do not get any public benefit. Only the woman with an average work history in the lowest wage category gets a public benefit, if it is price-indexed. A larger group gets it if it is wage-indexed.

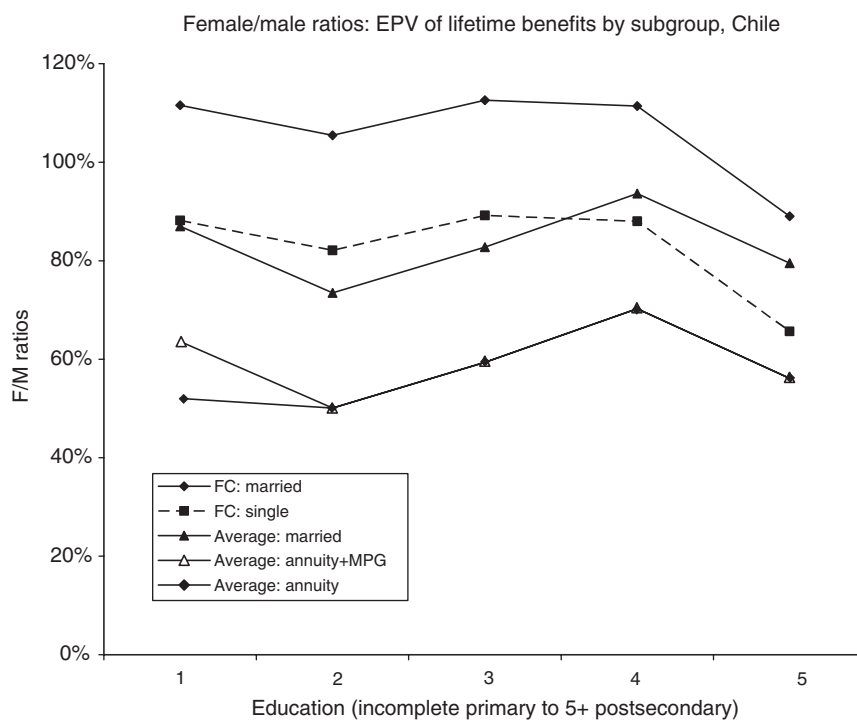


Figure 4-5a. EPV of full-career married women exceeds that of men in Chile.

Note: EPV = expected present value.

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Female/male ratios of lifetime benefits, by subgroup, Argentina

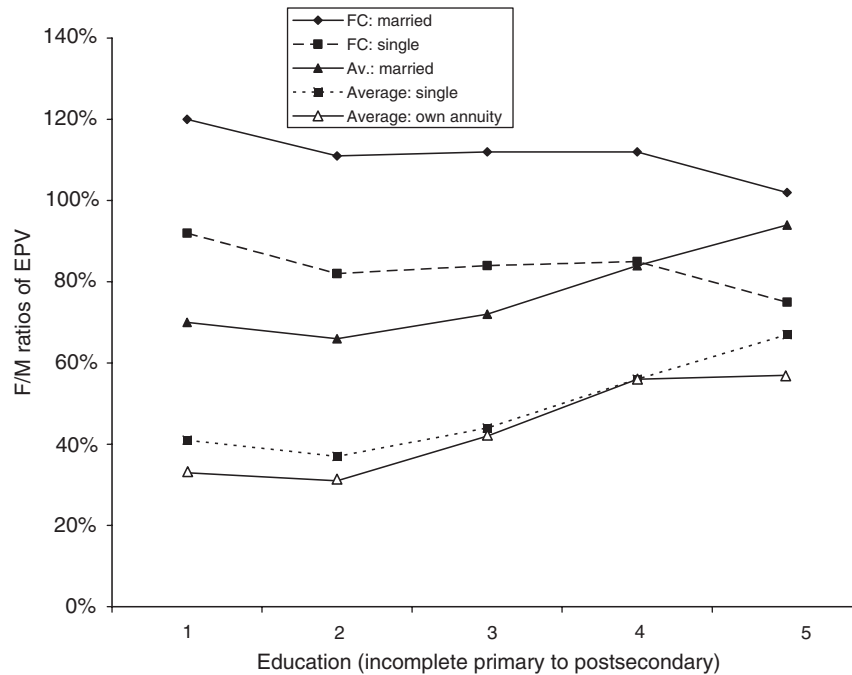


Figure 4-5b. EPV of full-career married women exceeds that of men in Argentina.
Note: EPV = expected present value.

Implicitly, unisex tables were used. Women could retire five years earlier than men with no actuarial penalty in Chile and Argentina. In all three countries, a minimum pension protected low-earning women who satisfied the eligibility requirements.

Contrary to these provisions that favored women, the old systems based their benefits on the wage earned during the last few working years, which favored men. Because of inflation and real wage growth, a woman who worked at ages 20–30, before childbearing, would find her pension based on wages that would appear to be very low compared with prevailing wages at her retirement at ages 60–65. Moreover, this formula for the pensionable wage base favored workers with steep age–earnings profiles, who tended to be highly educated men. By contrast, in the new system contributions made in early adulthood add more to present value of lifetime benefits than contributions made in the final years because of compound interest that far exceeds the growth rate of prices or wages.

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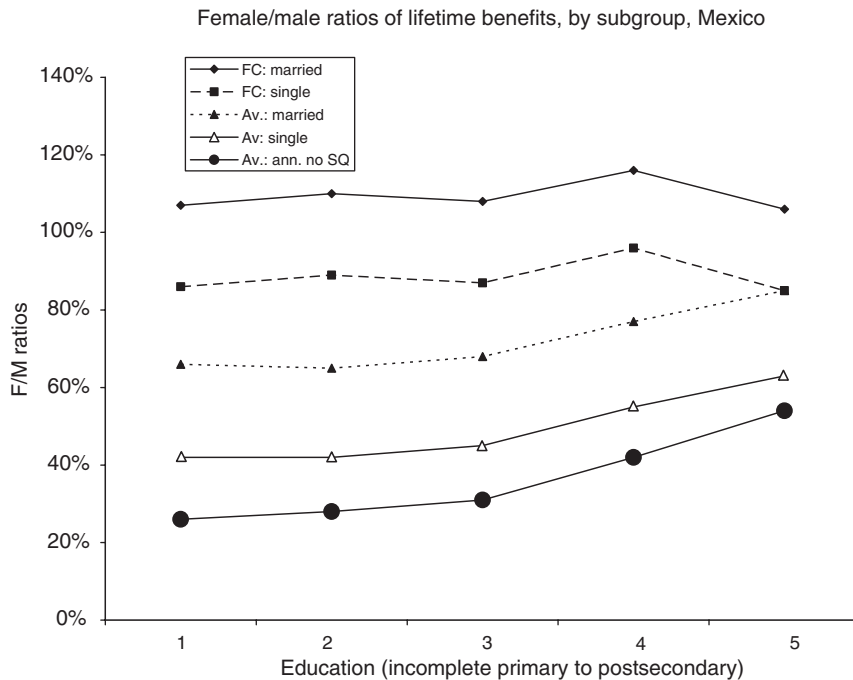


Figure 4-5c. EPV of full-career married women exceeds that of men in Mexico.
Note: EPV = expected present value.

In the old systems in Chile and Argentina, women usually 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. In the new systems, women keep their own benefit as well as the requisite joint annuity. Further, as we have seen, the new public benefits are tilted toward low earners, who are predominantly women. Thus there are pushes and pulls in both directions a priori, so the impact of the reforms on gender ratios is an empirical question, which we shall explore.

It is also worth noting that pensions in the old system often were not indexed for inflation, yet inflation was high in these countries, devaluing the benefit. This especially hurt women, who live longer and therefore experience greater price increases. In contrast, annuities in the new system in Chile are price-indexed; Mexico plans to index them also. Public benefits in these countries are also indexed for inflation or higher. We abstract from inflation because of its uneven nature and the unpredictable ad hoc responses that were made by the old systems, which biases our results against the new systems.¹³

TABLE 4-5 Female/Male Ratios of Expected Present Value of Lifetime Benefits
in New vs Old Systems (in Percentages)

<i>Education</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Chile</i>					
<i>Old system</i>					
Av.: own pension	78	63	100	99	75
Av.: own + widow's	78	67	100	99	76
FC: own pension	82	72	94	68	70
FC: own + widow's	82	72	94	68	70
10 yr: own + widow's	78	58	54	60	45
<i>New system</i>					
Av.: own-annuity	52	50	59	70	56
Av.: own + MPG	64	50	59	70	56
Av.: own + MPG + joint	87	73	83	94	79
FC: own-annuity	88	82	89	88	66
FC: own + joint	112	105	113	111	89
10 yr: own + joint	55	49	46	49	41
<i>Argentina</i>					
<i>Old system</i>					
Av.: own pension	21	13	33	55	60
Av.: own + widow's	40	30	47	64	68
FC: own pension	76	50	48	68	62
FC: own + widow's	80	57	55	69	65
10 yr: own + widow's	40	30	27	31	30
<i>New system</i>					
Average woman: own-annuity	33	31	42	56	57
Average woman: own + flat	41	37	44	56	67
Average woman: own + flat + joint	70	66	72	84	94
FC: own + flat	92	82	84	85	75
FC: own + flat + joint	120	111	112	112	102
10 yr: own + flat + joint	63	60	55	57	52
<i>Mexico</i>					
<i>Old system</i>					
Average woman: own pension	39	33	29	33	59
Average woman: own + widow's	77	71	68	72	97
FC: own pension	70	60	63	73	91
FC: own + widow's	108	99	102	112	130
10 yr: own + widow's	69	57	52	46	44
<i>New system</i>					
Average woman: own annuity	26	28	31	42	54
Average woman: own incl. SQ	42	42	45	55	63
Average woman: own + SQ + joint	66	65	68	77	85
FC: own incl. SQ	86	89	87	96	85
FC: own + SQ + joint	107	110	108	116	106
10-year: own + SQ + joint	51	50	48	50	45

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology.

Notes: The denominator is married man in same educational category. For ratios with own-annuity, this applies to men and women. For ratios with public benefit, this also applies to men and women. See text for methodology and see Table 4-1a for educational categories.

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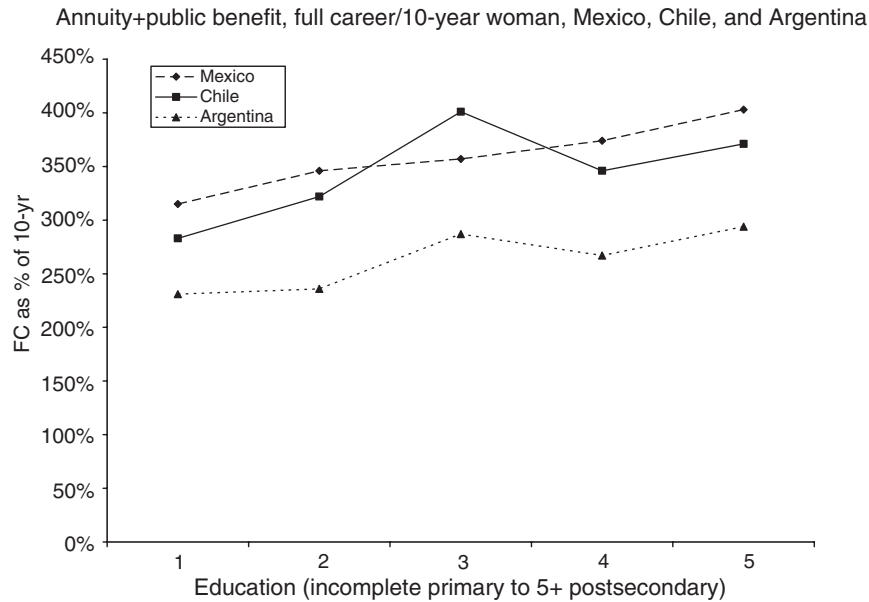


Figure 4-6. Full-career woman gets lower payoff for extra work (relative to 10-year women) in Argentina than in Mexico or Chile.

Results: Gender Ratios under the New and Old Systems

We now compare the ratios of lifetime benefits under the old and new systems for men and women with the same education. We find that (a) female/male ratios generally fall postreform when only the own-annuity is taken into account; (b) in Argentina and Mexico they rise modestly postreform when both the public and private benefits are included (this is the situation for single women with average work histories); (c) in all three countries gender ratios are much higher when benefits from the joint annuity are added and, of course, they are higher for full-career women; so (d) this brings the postreform relative position of average married women and full-career women, whether married or single, above that in the old system. These changes after the reform are due to the targeting of transfers to low earners, the fact that women do not have to give up their own pensions to receive the widow's benefit, and the heavier weight placed by the new system on early contributions due to compound interest (Table 4-5). For example, in Argentina the female/male ratio of lifetime pension for a single woman with an average work history and a secondary school education is projected to rise from 42 percent based on her own pension in the new system, to 44 percent including the flat benefit, to 72 percent

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if she marries, and to 112 percent if she works full career, compared with 33, 47, and 55 percent, respectively, for her single, average, married, and full-career married counterparts in the old system.

Which Subgroups Benefited (or Lost) the Most?

To further analyze which subgroups benefited the most from the reform, we calculate the ratio of postreform/pre-reform lifetime benefits for various marital, educational, and labor market groups. As noted above, we focus on relative changes because we do not know what the absolute benefit would have been under the counterfactual. Additionally, we wish to see how the relative positions of different subgroups of men changed. Therefore, instead of comparing women with men of the same education, we analyze the postreform changes for subgroups of each gender, relative to changes for married men in the top education category. That is, we calculate the postreform/pre-reform ratio for each subgroup and then divide (normalize) by the ratio for married male workers in the top educational group (see Table 4-6 and Figures 4-7a, 4-7b, and 4-7c). A ratio above 100 percent indicates that the given subgroup has gained more (or lost less) than did married males with the highest education. As expected, the biggest relative gainers were:

- low earners (as proxied by low educational category) of both genders, but especially women, who are the lowest earners in each category and therefore benefit disproportionately from the public benefit;
- married women (in Chile and Argentina)—because they can now keep their own annuity plus the joint annuity, whereas previously they had to give up one or the other;
- full-career women (in Chile and Mexico)—because they gain most from the actuarially fair private annuity; and
- single men—because they no longer have to subsidize the widow's benefit that was financed from the common pool in the old systems.

In all three countries, workers in the two lowest educational groups gain relative to those in the two highest groups. Married women and single men generally gain relative to married men. In Chile and Argentina, married women gain more than do single women (but vice versa in Mexico, because of the generous widow's benefit in the old system). In Chile and Mexico, full-career women gain the most from the reform—and over time this may induce more women to participate in the labor market full career. In Chile, the relative position of ten-year women actually falls. In Argentina, however, average and ten-year women register the largest relative gains because of that country's flat benefit for retirees with only ten years of work.

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TABLE 4-6 Expected Present Values of Postreform/Pre-reform Lifetime Benefits (in Percentages) (Relative to Ratio for Married Men in Top Educational Group) ($r = 5\%$ during Accumulation, 3.5% during Annuity Stage, Real Wage Growth = 2%)

<i>Education</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Chile</i>					
<i>Average man</i>					
Married man	123	117	117	94	100
Single man	148	141	142	114	121
<i>Women</i>					
Average woman: own + MPG	99	92	69	67	74
Average woman: own + MPG + joint	136	128	97	89	105
Full-career woman: own-annuity	133	134	112	122	94
Full-career woman: own + joint annuity	168	172	141	154	128
10-year woman: own + joint annuity	85	98	99	77	91
<i>Argentina</i>					
<i>Average man</i>					
Married man	188	130	94	111	100
Single man	219	154	112	132	121
<i>Women</i>					
Average woman: own annuity + flat	373	366	128	114	112
Average woman: own + flat + joint	325	281	144	143	137
Full-career woman: own + flat	228	216	167	140	123
Full-career woman: own + flat + joint	278	251	188	178	155
10 year woman: own+flat+joint	294	252	186	204	173
<i>Mexico</i>					
<i>Average man</i>					
Married man	181	150	122	89	100
Single man	219	181	147	107	120
<i>Women</i>					
Average woman: own incl. SQ	199	195	187	146	108
Average woman: own incl. SQ + joint	154	138	122	96	88
Full-career woman: own incl. SQ	225	221	169	116	94
Full-career woman: own + SQ + joint	180	166	130	92	82
10-year woman: own incl. SQ + joint	134	130	114	95	103

Source: Calculations by authors. See text and James, Edwards, and Wong (2008) for fuller discussion of data and methodology.

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 $(PV_{new}/PV_{old}) =$ ratio of the present value of lifetime benefits in the new versus old systems for group i . This is normalized by the ratio for reference group k , where $k =$ married men in the highest educational category. If the number in a cell is $>100\%$, this means the category gained more than top married men. For educational categories see Table 4-1a, and for methodology see text.

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Postreform/prereform ratios of EPV, by subgroup (normalized by ratio of top ed. man), Chile

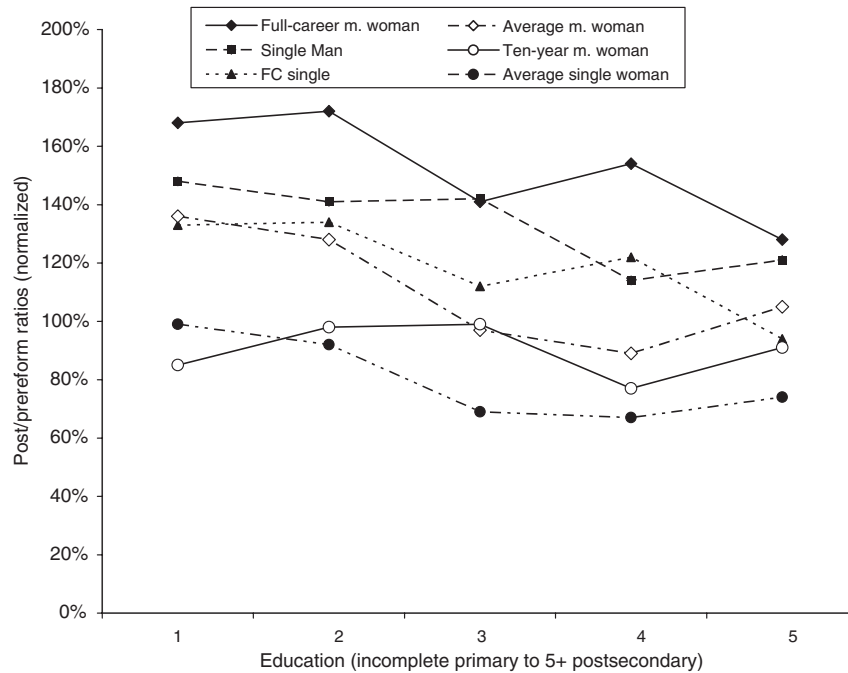


Figure 4-7a. Low-earning full-career married women and single men are biggest relative gainers from the reform in Chile. *Note:* EPV = expected present value.

Single Women

Given the importance of the joint annuity, how do single women fare? This question is important because an increasing proportion of women are divorced or never married. Divorce became legal in Chile in 2004, and the proportion of divorced women doubled in Mexico over the past three decades. Cohabitation is not uncommon among low-educated groups in Latin America, and many children are born out of wedlock to parents in informal arrangements. Single women are a heterogeneous group, including those who were divorced, widowed, and never married, whose behavior may vary. Construction of synthetic work histories of single women, broken down into subgroups when possible, indicates that full-career women without joint annuity or widow's benefit are a reasonably good proxy for never-married women (James, Edwards, and Wong, 2008).

In the new systems in all three countries, lifetime pensions of full-career single women are lower than those of men, because of their smaller wages

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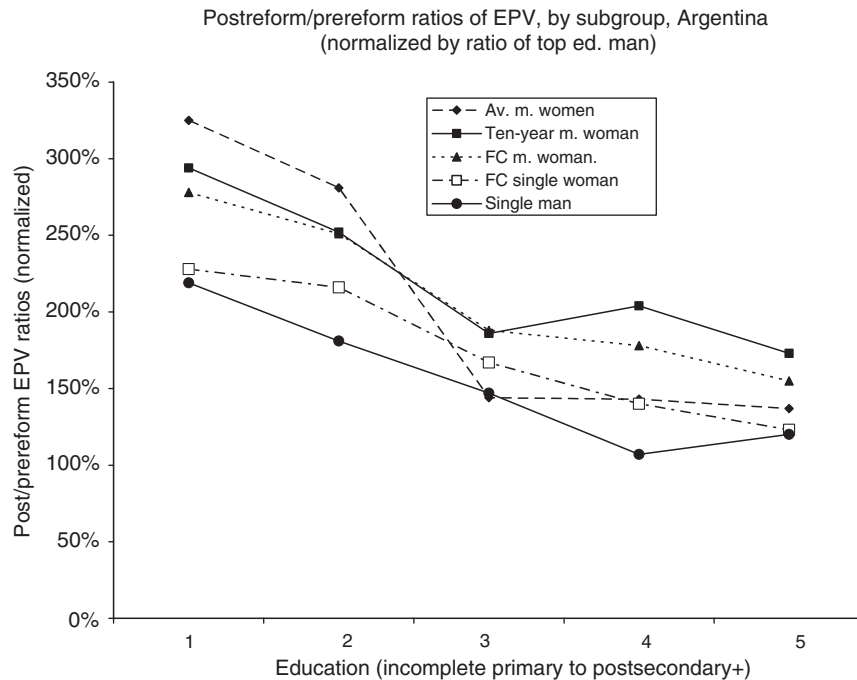


Figure 4-7b. Low-earning average and 10-year married women gained most of all (Argentina). *Note:* EPV = expected present value.

and greater longevity, or of full-career married women, because they do not get the joint annuity. In Argentina and Mexico, the pension income of single full-career women rises postreform compared to single or married men, because of the relatively generous public benefit that flattens total benefits. In contrast, in Chile, where they are unlikely to collect an equalizing public benefit, their position falls relative to single men but rises relative to married men (Table 4-6 and Figures 4-7a, 4-7b, and 4-7c). Concerns about the situation of single women could be addressed through measures such as (a) the use of unisex mortality tables in pricing annuities (redistributing from men in general to women in general), (b) partial wage-indexation of public benefits for the very old (redistributing to those who live longer), or (c) equalization of women's retirement age with that of men (requiring them to work as long as men to raise their old-age consumption). Basically, the pensions of single women are likely to approach those of men only when their wages and work experience approach those of men.

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Postreform/prereform ratios of EPV, by subgroup, Mexico
(normalized by ratio of top ed. man)

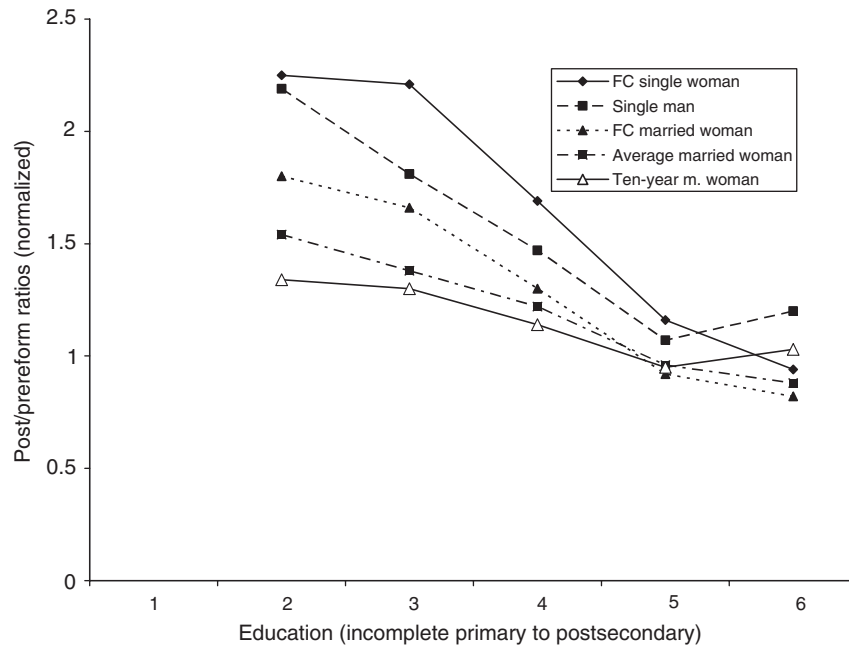


Figure 4-7c. Low-earning FC single women and single men are biggest relative gainers from the reform in Mexico. *Note:* EPV = expected present value.

Implications for Social Security Reform in Other Countries

To sum up, the empirical investigations show that (a) women's own-annuities are lower than those of men in multipillar pension schemes, as they would be in any scheme tying benefits closely to contributions; but (b) women are recipients of net public transfers and private intrahousehold transfers through joint pensions required in the new systems. Consequently, (c) women have gained more than men from the reforms; the lifetime gender ratio has improved (these ratios would improve still more if the retirement age for men and women were equalized). Finally, (d) work incentives are stronger in Chile and Mexico, where full-career women gain the most, while Argentina affords greater protection for women with limited labor market participation.

Individual account systems can improve relative outcomes for women and have done so in Latin America. However, the gains to women are

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not inevitable. The gender impact largely depends on the detailed design features of these reforms. The favorable outcomes we have described for Latin-American women contrast with those in the transition economies of Eastern and Central Europe, where preliminary investigations suggest that women lost relative to men because of the removal of privileges they had in the old system, maintenance of an earlier retirement age, absence of a targeted public pillar, the weakening of survivor's benefits, and the failure to require joint annuities (Castel and Fox 2001; Woycicka 2001). In Sweden, too, women's position deteriorated for many of the same reasons (Stahlberg, Kruse, and Sunden 2006a, 2006b). Other countries contemplating such reforms, and countries trying to improve traditional DB systems, can draw a number of lessons on how to improve gender outcomes.

1. *A safety net and minimum pension are especially important for women.* Because of women's lower lifetime earnings, a redistributive public benefit is particularly important. Chile's MPG, Mexico's SQ, and Argentina's flat benefit are projected to improve women's lifetime pensions substantially, narrowing the gender gap. Two dangers are (a) rules that largely exclude women (such as Mexico's twenty-four-year requirement for the MPG), and (b) rules that discourage their participation in the formal labor market (such as the high marginal tax rate for low earners who have just met the twenty-year eligibility rule in Chile). The MPG and Argentina's flat benefit could be redesigned to increase with years worked, thereby providing positive work incentives. Mexico's SQ already does this.

2. *The public benefit should be at least partially wage-indexed for successive cohorts.* It is essential that the public benefit rise at least as fast as prices so its purchasing power does not fall over the lifetime of the retiree, a trend particularly harmful to women, who live longer than men. Most reformed Latin-American systems price-index the public benefit. However, price-indexing may not be enough to equalize benefits for men and women in the long run. The simulations for Chile showed that as wages grow, a price-indexed MPG would set a floor for very old women and future cohorts far below the pensions of men and the average standard of living. In practice, Chile's MPG has increased with wages and is likely to keep women's retirement income rising on par with the average standard of living. A wage-indexed MPG is costlier, however, and produces larger work disincentives. The Swiss system uses a compromise: it indexes its benefit half to wages and half to prices. Policymakers and citizens will have to evaluate this tradeoff between saving money versus maintaining the relevance of the safety net over time.¹⁴

3. *Annuity insurance for annuities are important for women.* Annuity insurance, which provides a guaranteed income for life, is especially important for women in view of their greater longevity. Although it is

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automatically achieved by a DB system, it could also be built into an individual account system. Latin-American workers can either purchase an annuity or take gradual withdrawals; lump-sum withdrawals are not allowed unless the person's pension exceeds a high threshold. However, if the person lives longer than expected, the gradual withdrawal may become very small as voluntary savings are used up. This problem can be prevented by mandatory annuitization, at least up to a threshold well above the poverty line.

Inflation insurance is important for the income from the individual account, just as for the public benefit. In Latin America, during the accumulation stage account, balances grow with the rate of interest, which is generally greater than the inflation rate. During the payout stage, annuities in Chile are price-indexed; Mexico plans to do the same. Chile facilitates price-indexing by the prevalence of indexed bonds and other financial instruments in which insurance companies can invest. The paucity of indexed instruments in many other countries will make price-indexing more difficult and costly.

4. *Joint pensions should be required in the payout stage.* Women often work fewer years as part of an informal family contract in which the husband agrees to support the wife in exchange for the time she spends caring for the family. In Latin America this contract is enforced even after the husband's death by requiring that all workers purchase survivor's insurance before retirement and joint pensions on retirement¹⁵—an important requirement to build into any individual account system. In contrast, when spousal and widow's benefits are financed from the common pool, as in DB systems, single men and women are penalized, since they must pay into the pool even though they are not eligible for this benefit.¹⁶ An added bonus of joint annuities is that they defuse the contentious unisex issue; in the case of joint annuities, payouts for men and women are largely invariant to the choice of unisex versus gender-specific tables. The systems we are analyzing do not contain detailed mechanisms for how to handle accumulations and joint annuities in the case of divorce. These rights clearly need to be defined, with account-splitting a logical solution when marriages dissolve.

5. *Widow's benefits should not penalize working women.* The treatment of widow's benefits in DB systems often penalizes working women. In the old Chilean and Argentine schemes, and in many other countries, working women must choose between their own or the widow's benefit—they cannot get both. Thus, women who work in the market for much of their lives pay substantial taxes with little or no incremental benefit. On the contrary, in the new Latin-American systems the widow keeps both her own and the joint annuity, because her husband has financed the latter. Market work by the wife is rewarded and widows are protected, without imposing an

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additional burden on the public treasury. Women's right to keep their own annuity in addition to the joint annuity is a major reason for the narrowed gender gap in the new systems.

6. *Equalizing retirement ages for men and women and providing work incentives will substantially narrow the gender gap.* Part of the reason for the lower own-annuities of women in Chile and Argentina is that women's retirement age is five years earlier than men's retirement age—also common in other countries. Under reasonable assumptions about rates of return, women's annuities would go up by 50 percent if they retired five years later (they earn interest in the meantime and the annuity covers fewer years). This scenario would substantially narrow the gender gap in pensions without requiring public or household transfers and would ensure that lifetime retirement savings are allocated to old age instead of young old age. This is especially important for single women, who will not receive a boost to their incomes from the joint annuity. The postponed access to retirement saving may encourage additional work by older women, and will therefore increase the country's productive capacity. For the same reason, as noted above, it is important to build work incentives into the public benefit, both in traditional and in new multipillar systems.¹⁷

7. *Which women should benefit from redistributions?* Among low earners, each country must decide whether it wishes to target those who have chosen to work fewer years versus those whose productive capacity is low so they can only earn low wage rates. Many countries are very conflicted on this issue. As we have seen, Chile, Argentina, and Mexico have made different decisions about which groups of women should be subsidized and, in doing so, are encouraging different behaviors. In particular, their rewards for women who engage in market versus home work differ.

Mexico's SQ is a flat payment per day worked, so is strongly pro-market work. It redistributes most to those who work a lot in the market, although at low wage rates. Argentina, on the other hand, subsidizes women who stay at home with a flat benefit that they receive so long as they participated in the labor market for ten years. This redistribution gives older women a subsidized income even if they had the educational capacity to work and earn high wages but chose not to do so. Chile is ambivalent on this issue. Its MPG redistributes to women with low earnings—but only if they have worked in the market for at least twenty years. Other countries solve this problem by treating years spent caring for children as part of working time. Along similar lines, husbands could be required to contribute to the individual accounts of their spouses who work in the home, through the income tax system. This would reduce the need for a public subsidy.

It may be interesting to see how the current US system compares with Latin America in its choice between subsidizing low wages versus low work,

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homework versus market work. In the USA, a higher rate of return is provided to those with low lifetime earnings, providing they have worked for at least ten years. (This tends to be offset by above-average mortality among low earners.) The US formula does not distinguish between people who have worked a little at high wage rates and those who have worked a lot at low rates. Studies have shown that often low earnings result from low years of work rather than low wage rates (Coronado, Fullerton, and Glass 1999, 2000; Gustman and Steinmeier 2000).

Caveats and Gaps

This chapter has identified a number of issues and gaps that have yet to be addressed, such as price versus wage indexation of the public benefit, the retirement age differential between men and women, and the retirement income problem faced by single women, divorced women, and women cohabiting without formal marriage. On a more fundamental level, this chapter has dealt with women who are in or who have husbands in the formal labor market and the contributory social security system. It does not address the large group of rural women in low-income countries who do not meet these criteria and who may have little income or savings when they become old. If the family system does not work for these women, a noncontributory program of some sort is needed to keep them out of poverty. How such a program should be structured and how it relates to the contributory scheme is a complex topic that goes beyond the purview of this chapter.

Every system works in practice somewhat differently from what was initially written on paper, partly due to unexpected circumstances that require system modification and partly due to behavioral responses to system incentives. This outcome was very true of the Latin-American systems in the past and will certainly be true of the new systems. For example, it is well known that the labor force participation rates of women are increasing, so younger female cohorts will have higher relative pensions than older cohorts. The new systems themselves may accelerate this process. The Argentine reform has already been modified several times and is likely to be modified again in the coming years as economic conditions change. Similarly, the political decision to raise the MPG in Chile on par with wages rather than prices means that it is much more pervasive than was initially envisaged. Finally, recent research has found that most workers retire earlier than the 'normal' age and contribute to the system for only part of their working lives (Berstein, Larrain, and Pino 2005; Edwards and James 2005; James, Martinez, and Iglesias 2006). This directly reduces their accumulations, pensions, and eligibility for the public benefit.

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Each of these changes is likely to alter the gender gap in pensions as well as the redistributive and equalizing role of public benefits. We cannot really know how the system *has worked*, as distinct from how it *is projected to work*, until after many workers have retired and data on their behavior and incomes become available. In the meantime, we can examine how the systems that were put in place originally would work and, most important, which design features produce these results. These positive findings will in turn teach us how to create newer systems that are most likely to give us the gender effects that we normatively prefer.

Notes

¹ In the USA, 60% of people older than 65 years and 72% of those older than 85 years are women, and this disparity has increased over time. The poverty rate of women older than 65 years is 15%, compared with 7% for men older than 65 years. The poverty rate for women older than 85 years is 20%, and for divorced, separated, or never-married elderly women, it is 27% (see Shirley and Spiegler 1998; Street and Wilmoth 2001). Poverty rates for the elderly are more difficult to measure in developing countries, where older people are likely to live with their grown-up children in extended family arrangements. Moreover, we do not know how the total consumption of the household is distributed.

² For similar reasons, women are likely to serve as caregivers for their husbands, but then outlive their spouses and need formal caregivers themselves. Thus, costs of provisions for long-term care are especially important for women. However, this issue goes beyond the scope of this chapter.

³ In all three countries fees as percentage of assets were higher initially than they are now due to fixed costs and rising assets. Lower fees produce higher pensions but leave gender ratios unchanged, since both men and women are charged the same proportion of their contributions or assets.

⁴ In Argentina the new system has been under re-examination because of the fiscal crisis and political pressures to increase benefits. The contribution rate, for example, has been temporarily reduced and a new minimum pension that is about 45% of the average taxable wage has been introduced. Moreover, individuals are now permitted to claim credits for periods of self-employment on their date of retirement, simply in exchange for taking a 20% reduction in benefits in lieu of prior contributions. About half of all current retirees receive the minimum benefit (personal communication with Rafael Rofman, World Bank, April 2005). Women are recipients disproportionately (but note that most of these pensions are based on the old system, since the new system has been in effect only for ten years). The old system also changed frequently, was not always implemented as written, and several regimes coexisted. We base our analysis and discussion on the new system that was put in place in 1994 and the old system as written, for the main regime, shortly before the reform.

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⁵ Actually, the worker can choose to apply this contribution toward a public DB or a private DC plan similar to the Chilean model. As of 2001, over 80% of all affiliates were in the private DC rather than the public DB, which is why this chapter focuses on the private DC option.

⁶ INFONAVIT historically provided a negative real return, but the hope of the reformers was that this would eventually change. In our simulations we assume a 0 real return.

⁷ The Chile estimates are based on CASEN 94, a nationally representative household survey. Our estimates are based on the urban sample—approximately 100,000 individuals aged 16 years or older. The Argentine data are based on the microdata set of the Encuesta Nacional de Gastos de los Hogares (ENGH) for 1996–7, a nationally representative household survey from urban areas. The sample contains 103,858 individuals, of whom 69,895 were aged 16 years or older. The Mexican data come from the 1997 Mexican National Employment Survey (ENE-97) completed by the Instituto Nacional de Estadística, Geografía e Informática (INEGI), or the Mexican Statistical Bureau. The sample contains information on 119,405 individuals aged 12 years or older. We use the subsample corresponding to more urban areas (communities of 100,000 people or more), which is about 78% of the sample. For more details on data-sets, potential data problems, and construction of tables, see James, Edwards, and Wong (2003*a*, 2003*b*, and 2008.)

⁸ In the USA and Europe, where portfolio choice might be greater, it has sometimes been argued that women are more conservative investors than men—e.g. see Jianakoplos and Bernasek (1998), Bajtelsmit, Bernasek, and Jianakoplos (1999), Bernasek and Shwiff (2001). For surveys of this literature, see US GAO (1997) and Burnes and Schulz (2000). The restrictions on portfolios in Latin America during the period of our study preclude this possibility. However, in 2002 Chile introduced portfolio choice, and other countries are following suit, so the problem may also arise in Latin America.

⁹ Our analysis concentrates throughout on the benefit rather than the cost side. We do not know the future cost of the public pillar, its intergenerational burden, or its gender incidence, either in the old or new systems. Net redistributions from public benefits (transfers received minus taxes implicitly paid to finance them) are discussed in James, Edwards, and Wong (2003*a*, 2003*b*, and 2008), based on the simplifying assumptions that each cohort covers its own bill and, within each cohort, the tax burden is distributed proportionally to earnings, as proxied by the present value of lifetime own-annuities.

¹⁰ Labor informality in Latin America leads many workers, especially women, to contribute for less than half of their adult lives, so they fail to meet the twenty-year requirement. Chile also offers a noncontributory social assistance program called pensiones asistenciales, or PASIS, funded out of general revenues, which pays about 50% of the MPG. PASIS is designed to keep out of poverty those elderly not eligible for contributory benefits. The vast majority of its recipients are women living in rural areas.

¹¹ Many men, however, do not contribute when they work, leading to the problem of low density of contributions. The government apparently is unable to enforce the contribution requirement effectively. Consequently, retirees will have low pensions

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and may demand that the government bail them out. How to handle this problem is a pressing issue today in most Latin-American countries.

¹² Several subsystems coexisted in Chile and Argentina, but a common formula paid 50% of pensionable salary for the first 10 years of work plus 1% per year thereafter. In Mexico, the old system paid a proportion of the base salary for the first ten years plus an increment for every year over ten. The proportion of the base varied negatively with wages, ranging from 13% for high earners to 80% for low earners. The increment for additional years varied positively with wages, ranging from 0.56 to 2.45% per year (see James, Edwards, and Wong 2003*a*, 2003*b*, and 2008 for details).

¹³ Note that the old systems sometimes indexed the minimum benefits for inflation but did not index higher benefits. In this case, many people received the minimum pension during inflationary periods. This produced high gender ratios but at very low absolute pension levels.

¹⁴ The US social security system now price-indexes the benefit once the individual has retired, but wage-indexes the first pension received so that successive cohorts start out with pensions that have gone up with wage growth. Some policymakers have proposed full price indexation, so that the real benefit will be frozen in today's value. Critics point out that this will lead the benefit to eventually become much smaller relative to the average wage and the average standard of living in society. One compromise would wage-index for the bottom half while price-indexing for the upper half (progressive indexation), which would lead eventually to a flat benefit. Another compromise would index the entire public benefit half to wages and half to prices, as in Switzerland (or to longevity increases, which is roughly equivalent).

¹⁵ In Chile wives do not have to purchase joint pensions to cover their husbands.

¹⁶ In the USA, a spouse older than 65 years receives 50% of her husband's benefit, even if she has not worked and contributed. After he dies she gets 100% of his benefit, which means that married couples receive larger benefits than (and are subsidized by) singles with the same total earnings, and couples with one wage-earner get larger benefits than (and are subsidized by) couples in which both husband and wife work, with the same total earnings. Furthermore, the nonworking wife in a single-earner family gets a larger benefit than the wife in a dual-earner family with the same total family income. For examples, see Shirley and Spiegler (1998).

¹⁷ This could also be built into traditional DB systems by reducing the benefits of husbands on an actuarially fair basis to finance the survivor's benefits of their wives. Widows could then keep their own benefit in addition to the survivor's benefit, thereby improving their own as well as the treasury's well-being.

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