This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Risk Aspects of Investment-Based Social Security Reform

Volume Author/Editor: John Y. Campbell and Martin Feldstein, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-09255-0

Volume URL: http://www.nber.org/books/camp01-1

Publication Date: January 2001

Chapter Title: The Risk of Social Security Benefit-Rule Changes: Some Internatio Evidence

Chapter Author: John McHale

Chapter URL: http://www.nber.org/chapters/c10596

Chapter pages in book: (p. 247 - 290)

7

The Risk of Social Security Benefit-Rule Changes
Some International Evidence

John McHale

Issues of risk are, understandably, receiving a lot of attention in the debate over the relative merits of investment-based (IB) and pay-as-you-go (PAYGO) social security systems. The risks to retirement income associated with IB systems are well known and at least partly offset the attractiveness of their higher expected returns relative to a PAYGO system.[1] Yet PAYGO systems are not free from risk either. An important source of risk associated with these more traditional social security systems is commonly referred to as *political risk*—defined here to be the risk that benefit rules will be changed through the political process before or during one's retirement, thereby changing the value of retirement benefits. For the United States, evidence that people perceive such a risk comes from opinion surveys that show low confidence in the ability of social security to pay the benefits due under current rules, although those surveyed do expect to receive some benefits (see Reno and Friedland 1997).[2] It is also interesting to note how the reform debate has been framed in terms of "saving social security," especially after President Clinton's 1998 State of the Union address, which had saving the program as its centerpiece. In part, this is an attempt to make use of the risks people perceive in terms of the sustainability of current rules to spur reform.

Under the social security benefit rules for current retirees, the share of state-funded pension expenditures in GDP is set to rise as populations in

John McHale is associate professor of economics at Harvard University.

1. For different perspectives on how risk affects the attractiveness of IB systems, see Geanakoplos, Mitchell, and Zeldes (1998) and Feldstein and Ranguelova (1998).

2. Interestingly, although respondents claimed to have little confidence in social security, they still expressed strong support for the program.

the major industrial economies become older.[3] Population aging is most pronounced for Germany and Italy, where it is projected that there will be one person over sixty-five for every two people of working age by 2030, compared to roughly one for four at present. If current high levels of pension generosity are maintained, old-age cash benefits must grow to account for almost one-quarter of GDP in both countries.[4] In the other G7 countries, where projected aging is not as pronounced and/or current pension benefits are less generous, projected GDP shares are lower, although the increases are still considerable in some cases. These projections of more costly state pension programs have led to concerns about increased labor market distortions (including higher unemployment), inadequate national saving, and declining returns on contributions for future generations of workers. Another possibility, however, is that greater costliness under current rules will lead to changes to those rules and, unless replacement provision is made, inadequate retirement incomes for current workers. Indeed, rule changes that reduce future benefits are not just something that might happen in the future. A number of countries, including Germany and Italy, have already responded by legislating downward adjustments to future benefit generosity.

While reasonably easy to describe, political risk of this kind is hard to quantify. The problem is similar to the problem of estimating credit (or default) risk on fixed-income assets; history is a poor guide to the probabilities and sizes of infrequent discrete adjustments. Nonetheless, given the importance of political risk to economic comparisons of risky retirement-income systems *and* to an understanding of the political economy of reform, it is important to have at least a sense of what these risks are.[5]

This paper takes a small step in assessing political risk. To see what can be learned about the effect on future benefits of the type of benefit reforms that have been pursued in recent years, I examine redefinitions of PAYGO benefit rules in the G7 countries from the mid-1980s through the mid-1990s. Until recent decades, rule changes tended to make systems more

3. Population aging will become pronounced after about 2010 because of the retirement of the post-World War II baby-boom generation and the fall in fertility rates in recent decades. Populations are also aging because of increased longevity.

4. *Generosity* is defined here as the ratio of the average benefit per elderly person to GDP per working-age person. I elaborate on this in sec. 7.1 below.

5. A common measure of the return (or money's worth) on PAYGO contributions is the ratio of the present discounted value of benefits to the present discounted value of contributions (see Geanakoplos, Mitchell, and Zeldes 1998). From the perspective of a worker at a particular point in time, there are a number of factors that make this return uncertain. The worker does not know with certainty his or her subsequent earnings profile, date of retirement, tax rates, length of life, rules for defining benefits, and so on. For this paper, I concentrate on the numerator of this return measure—the present discounted value of the stream of benefits. Moreover, to focus on the effects of changes in benefit rules, I assume fixed expectations for the earnings profile, retirement date, and length of life. The extent of this political risk depends, then, on the effect of various discrete rule changes on the stream of benefits and the probabilities of those changes.

generous rather than less. This was possible because favorable demographics (as baby-boom generations entered the labor force) and the immaturity of earnings-related pension systems made obligations under existing rules easily affordable.[6] Now that rapid population aging is on the horizon and most systems are mature, reform efforts are aimed at curtailing program costs. Recent rule changes have included increases in retirement ages (especially for women), changing the way postretirement benefits are indexed, and increasing the number of years of earnings included in the calculation of the initial benefit.[7] To gauge the effect of these reforms, my approach is to estimate the *change* in the present discounted value of the benefits an "average" household can expect to receive—or gross social security wealth (SSW)—as a result of a reform.

The results from this small sample show that benefit-rule changes that substantially reduce SSW are not unusual responses to projections of sharply rising costs fifteen to thirty years into the future. In some cases, the reforms do reduce the SSW of workers who are already at retirement age, although the sizes of the reductions are typically small. More often, however, the reforms are phased in so that their main burden does not fall on the currently retired or those close to retirement. Young and middle-aged workers appear to be willing to accept large reductions in their gross social security wealth while protecting the currently old. Assuming that the reforms are fully phased in by the time the worker retires, reductions in SSW of between one-quarter and one-third have not been uncommon. For middle-aged workers, this almost certainly means a loss of net social security wealth as well since they are unlikely to benefit to a great extent from resulting lower contribution rates given how the benefit cuts are phased in.[8] One possible explanation for this apparent sacrifice is that these workers see future political risk as related to the size of future contribution rates. By reducing the burden on future generations of workers through legislated future benefit cuts (and/or prefunding through tax increases, as in the United States), it might be that they hope to stem even more draconian cuts later on.

These calculations show that governments have responded to projections of sharp increases in dependency rates by curbing future benefit promises. It is not clear, however, how much of the adjustment to the

6. Small numbers of people were eligible for full pensions, while the contributor pools were large. As a consequence, low tax rates could support quite generous state pensions.

7. In this paper, I concentrate on reforms to the benefits rules of PAYGO systems in the G7 countries. Other major reforms aimed at curbing future tax increases include efforts to prefund future benefit obligations (Canada, Japan, and the United States) and allowing workers to partially opt out of the state system into occupational and personal saving schemes (the United Kingdom).

8. *Net social security wealth* is defined as the difference between the present discounted value of expected benefits and the present discounted value of expected future social security taxes (see Feldstein 1974).

projected demographic trends has already been made and what further adjustments are still to come. A number of factors point to the likelihood of significant further cuts. First, even with the recent reforms, the costs of state pension systems are still projected to rise steeply in most countries. Second, governments have proved willing and able to curb future benefit promises when they threaten to become too costly—which is probably the main message of this paper. And, third, proposals for additional reforms are being formulated and debated in most countries.[9]

The paper is organized as follows. Section 7.1 outlines how demographics and the maturing of benefit systems are creating financial problems in industrial country social security systems and documents that these looming strains have not significantly reduced the generosity of benefits for current beneficiaries. Section 7.2 then describes the mainly forward-looking reforms that have taken place in the 1980s and 1990s and estimates their impact on SSW. In section 7.3, I use a simple political economy model to help think about the puzzle of why self-interested current workers are willing to accept large cuts in their benefits while protecting the currently old. Section 7.4 concludes with some comments on how the response to population aging of cutting PAYGO benefits might affect the adequacy of retirement income in the future and on the possibility of replacing rather than simply reducing retirement income using a mandatory IB system.

7.1 Demographic Trends, Pension Generosity, and Fiscal Strains

It is well known that, under current benefit rules, spending on state pensions as a share of the economy will grow dramatically as populations age (see, e.g., OECD 1997; and Bosworth and Burtless 1998a). This will impose a heavy burden on future workers if they are willing to meet this higher cost, in part because of the expanded distortions brought about by the higher required taxes. If they are not willing to meet this tax burden, future retirees (i.e., current and future workers) are faced with the prospect of having inadequate retirement incomes. One might expect that this prospect would lead to a cut in the generosity of *current* benefits. Such a cut would free up tax revenues to use to prefund future benefits or at least provide a better return on the taxes that are paid (for any given future benefits).

Figure 7.1 shows that there has not been any significant scaling back in the generosity of benefits during the 1980s and 1990s. The figure uses the fact that the cost rate for state pensions (i.e., the state pension expenditure-GDP ratio) can be decomposed into the product of the elderly depen-

9. When assessing the overall risk of future benefit-rule changes, we must also keep in mind that, while we are sure that dependency rates will increase sharply over the next thirty years, there is uncertainty about what the exact dependency rates will be.

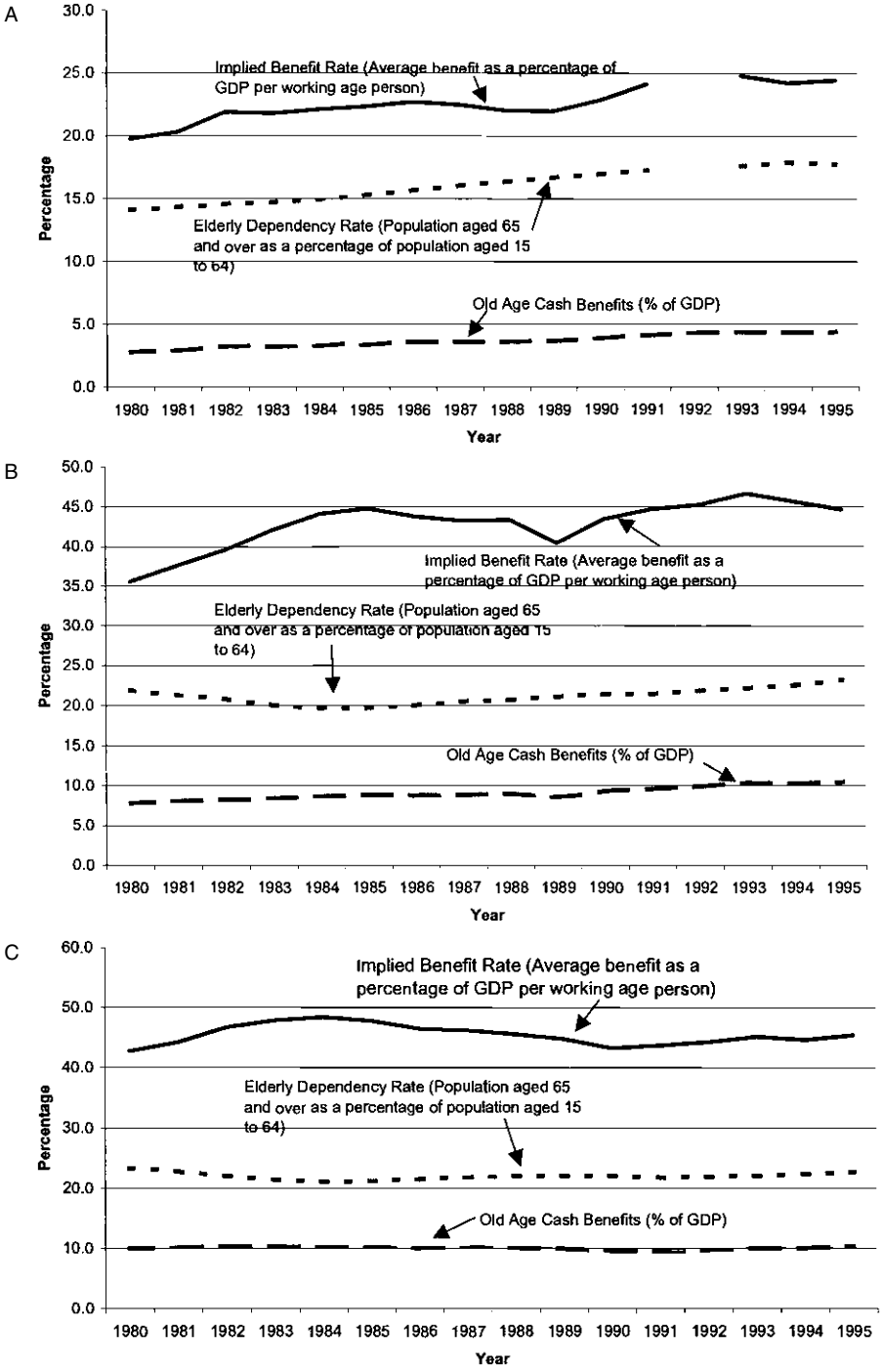
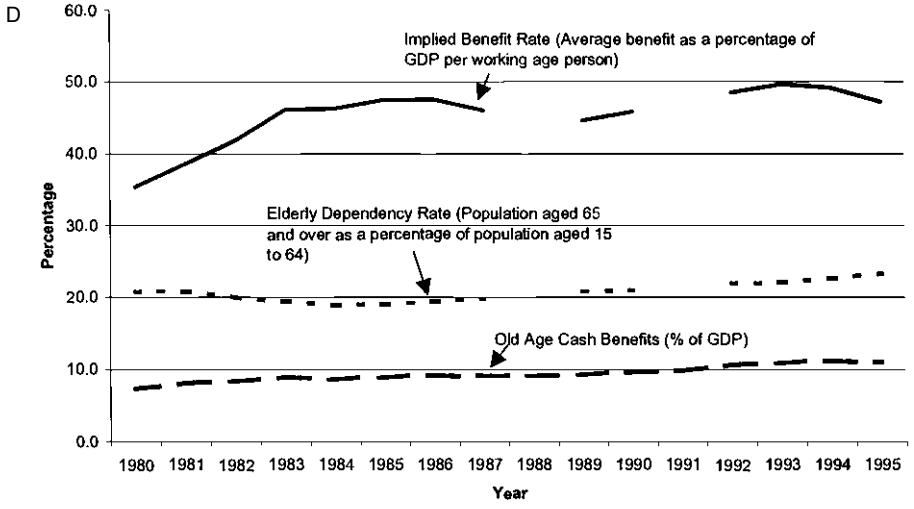
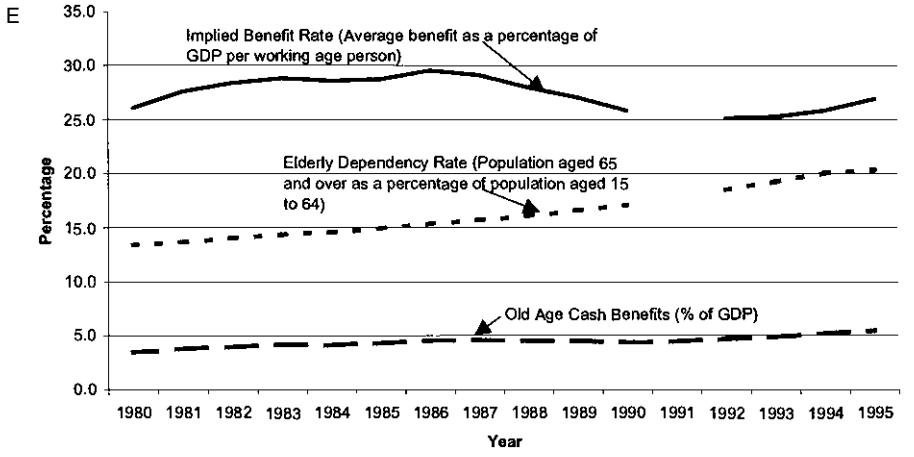


Fig. 7.1 Old-age cash benefits, OECD expenditure (SOCX) and demographic data: *A*, Canada; *B*, France; *C*, Germany; *D*, Italy; *E*, Japan; *F*, United Kingdom; *G*, United States


D
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percentage
Implied Benefit Rate (Average benefit as a percentage of GDP per working age person)
Elderly Dependency Rate (Population aged 65 and over as a percentage of population aged 15 to 64)
Old Age Cash Benefits (% of GDP)
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
Year


E
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Percentage
Implied Benefit Rate (Average benefit as a percentage of GDP per working age person)
Elderly Dependency Rate (Population aged 65 and over as a percentage of population aged 15 to 64)
Old Age Cash Benefits (% of GDP)
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
Year

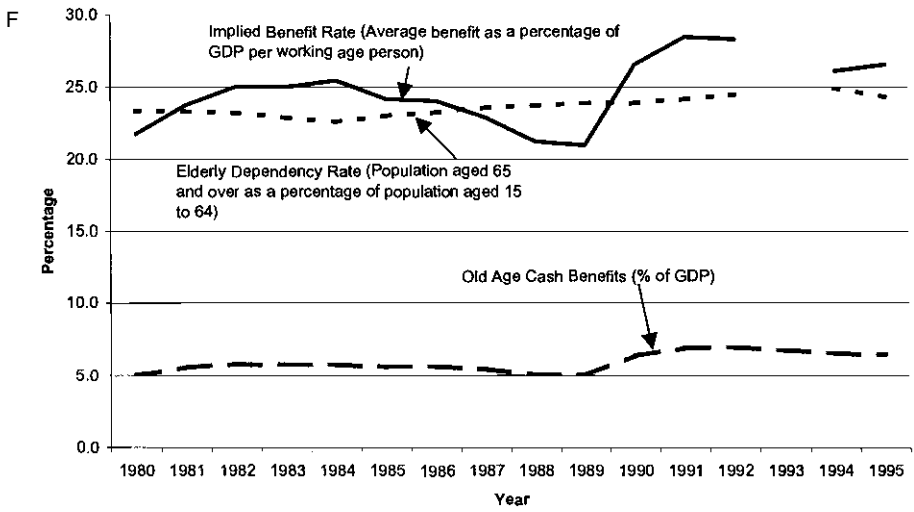

F
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Percentage
Implied Benefit Rate (Average benefit as a percentage of GDP per working age person)
Elderly Dependency Rate (Population aged 65 and over as a percentage of population aged 15 to 64)
Old Age Cash Benefits (% of GDP)
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995
Year

Fig. 7.1 (cont.)

G

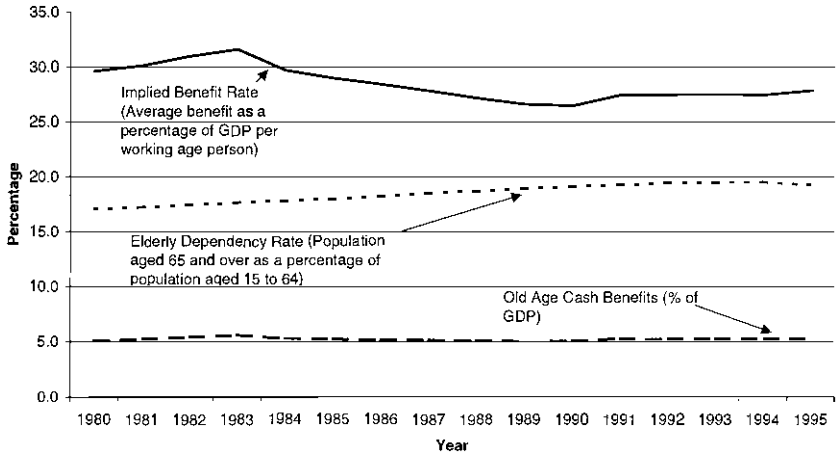


Fig. 7.1 (cont.)

dency rate and the benefit rate. The elderly dependency rate that is used is the ratio of the population age sixty-five or older to the population between age fifteen and age sixty-four. And the *implied* benefit rate is, then, the ratio of the benefit per elderly person to GDP per working-age person:

$$(1) \qquad \frac{\text{expenditure}}{\text{GDP}} = \frac{\text{elderly population}}{\text{working-age population}} \times \frac{\text{expenditure/elderly population}}{\text{GDP/working-age population}}$$

$$= \text{dependency rate} \times \text{benefit rate}.$$

Care must be taken in interpreting the benefit rate as a measure of generosity. The denominator in the average benefit-expenditure calculation is the number of elderly (defined as those sixty-five and over), not the number of retirees. Of course, people younger than sixty-five can be retired and receiving benefits, and not all those over sixty-five are retired. This broad generosity measure has the advantage, however, that it captures both the ease of eligibility for benefits (including the ability to access benefits at younger ages) and the average level of benefits paid to those who are actually retired. To see this, note that the broad generosity measure can be decomposed as

$$(2) \quad \text{benefit rate} = \frac{\text{expenditure/elderly population}}{\text{GDP/working-age population}}$$

$$= \frac{\text{retirees}}{\text{elderly population}} \times \frac{\text{expenditure/retirees}}{\text{GDP/working-age population}}.$$

Other things equal, the system will tend to become more generous if there is a trend toward early retirement and/or if the benefits paid to the retired rise relative to income per working-age person.[10]

The expenditure data used in the calculations are from the OECD Social Expenditure (SOCX) database and include all public old-age cash benefits. Survivor benefits are not included for these calculations, although I consider them briefly below. For the United States, to take an example, this comprehensive measure includes retirement benefits paid by the social security and the public employee retirement systems, means-tested benefits paid under supplemental security income (SSI), and benefits paid through a number of smaller programs.[11]

Over this period, the implied generosity of benefits has been in a range of 20–25 percent in Canada, Japan, and the United States, a bit more than this in the United Kingdom, and in the higher range of 35–50 percent in France, Germany, and Italy. The most generous benefits in this sample were recorded in Italy in 1993 at almost 50 percent. The least generous were in Canada in 1980 at just less than 20 percent. Generosity in Canada, France, and Italy has risen over the period (in the latter two quite sharply), has been reasonably stable in Germany and Japan, and has fallen in the United States. Generosity ended up higher in the United Kingdom, following an increase in the implied benefit rate between 1988 and 1991.[12]

The combination of generosity and demographics led the expenditure-GDP ratio to drift upward or remain stable in all countries. The real action, however, is still to come as postwar baby boomers begin to retire. Table 7.1 shows what projected increases in elderly dependency rates

10. Gruber and Wise (1998) document a strong trend toward early retirement in the industrialized economies.

11. These expenditures are only part of the state expenditures that are set to rise as populations age. Another important category of spending that is positively related to the elderly dependency rate is medical care. Kornai and McHale (2000) present time-series and cross-sectional evidence that the total health spending per person is positively related to the elderly dependency rate with an elasticity of between 0.1 and 0.2. They also report regressions that show that the share of total health spending undertaken by the public sector is positively related to the elderly dependency rate. A 1 percentage point increase in the elderly dependency rate is associated with roughly a 3 percentage point increase in the share of total spending undertaken by the public sector, although the size of the coefficient is sensitive to specification.

12. Given that benefit generosity is usually based on a comparison of benefits with wages rather than GDP per working-age person, it is helpful for getting an intuitive sense of the generosity involved to divide the benefit rate by the labor share of GDP. The result can be interpreted as the ratio of the benefit per elderly person to the wage per working-age person. I calculate this labor share as one minus the capital income share as reported in OECD (1998a). For 1995, the labor shares were 0.677 for Canada, 0.589 for France, 0.637 for Germany, 0.577 for Italy, 0.682 for Japan, 0.676 for the United Kingdom, and 0.638 for the United States. The implied benefit rates expressed as a percentage of wage income per working-age person were 36.7 percent for Canada, 75.7 percent for France, 71.3 percent for Germany, 81.8 percent for Italy, 39.4 percent for Japan, 39.3 percent for the United Kingdom, and 43.7 percent for the United States.

Table 7.1 **Total Public Expenditure on Old-Age Cash Benefits Assuming Benefit Rate (average benefit/GDP per working-age person) at 1995 Level—OECD Social Expenditure (SOCX) Database (all public programs)**

	1995	2000	2010	2020	2030
Canada:					
Dependency rate	17.7	18.2	20.4	28.4	39.1
Benefit rate	24.5	24.5	24.5	24.5	24.5
Expenditure-to-GDP ratio	4.3	4.5	5.0	6.9	9.6
France:					
Dependency rate	23.2	23.6	24.6	32.3	39.1
Benefit rate	44.6	44.6	44.6	44.6	44.6
Expenditure-to-GDP ratio	10.4	10.5	11.0	14.4	17.4
Germany:					
Dependency rate	22.7	23.8	30.3	35.4	49.2
Benefit rate	45.4	45.4	45.4	45.4	45.4
Expenditure-to-GDP ratio	10.3	10.8	13.8	16.1	22.3
Italy:					
Dependency rate	23.3	26.5	31.2	37.5	48.3
Benefit rate	47.2	47.2	47.2	47.2	47.2
Expenditure-to-GDP ratio	11.0	12.5	14.7	17.7	22.8
Japan:					
Dependency rate	20.4	24.3	33.0	43.0	44.5
Benefit rate	26.9	26.9	26.9	26.9	26.9
Expenditure-to-GDP ratio	5.5	6.5	8.9	11.6	12.0
United Kingdom:					
Dependency rate	24.3	24.4	25.8	31.2	38.7
Benefit rate	26.6	26.6	26.6	26.6	26.6
Expenditure-to-GDP ratio	6.5	6.5	6.9	8.3	10.3
United States I:[a]					
Dependency rate	19.2	19.0	20.4	27.6	36.8
Benefit rate	27.9	27.9	27.9	27.9	27.9
Expenditure-to-GDP ratio	5.4	5.3	5.7	7.7	10.3
United States II:[b]					
Dependency rate	19.2	18.7	19.1	24.8	31.9
Benefit rate (1995)	27.9	27.9	27.9	27.9	27.9
Expenditure-to-GDP ratio	5.4	5.2	5.3	6.9	8.9

Sources: OECD Social Expenditure (SOCX) database; OECD (1997); and Bosworth and Burtless (1998b).

Note: Expenditure-to-GDP ratio = [(dependency rate)(benefit rate)]/100.

[a]World Bank demographic projections.

[b]SSA demographic projections.

would imply for the cost of old-age benefits *if 1995 benefit rates were maintained.* (Table 7.2 shows how adding in survivor benefits changes these projections.) These mechanically projected trends in this cost rate are quite startling in some cases. At 1995 levels of generosity, old-age benefits account for close to a quarter of GDP in Germany and Italy. In France, given somewhat less pronounced aging, these pensions still account for

Table 7.2 **Total Public Expenditure on Old-Age and Survivor Benefits Assuming Benefit Rate (average benefit/GDP per working-age person) at 1995 Level—OECD Social Expenditure (SOCX) Database (all public programs)**

	1995	2000	2010	2020	2030
Canada:					
Dependency rate	17.7	18.2	20.4	28.4	39.1
Benefit rate	27.2	27.2	27.2	27.2	27.2
Expenditure-to-GDP ratio	4.8	5.0	5.6	7.7	10.6
France:					
Dependency rate	23.2	23.6	24.6	32.3	39.1
Benefit rate	52.6	52.6	52.6	52.6	52.6
Expenditure-to-GDP ratio	12.2	12.4	12.9	17.0	20.6
Germany:					
Dependency rate	22.7	23.8	30.3	35.4	49.2
Benefit rate	47.9	47.9	47.9	47.9	47.9
Expenditure-to-GDP ratio	10.9	11.4	14.5	17.0	23.6
Italy:					
Dependency rate	23.3	26.5	31.2	37.5	48.3
Benefit rate	58.7	58.7	58.7	58.7	58.7
Expenditure-to-GDP ratio	13.7	15.6	18.3	22.0	28.3
Japan:					
Dependency rate	20.4	24.3	33.0	43.0	44.5
Benefit rate	30.7	30.7	30.7	30.7	30.7
Expenditure-to-GDP ratio	6.3	7.5	10.1	13.2	13.7
United Kingdom:					
Dependency rate	24.3	24.4	25.8	31.2	38.7
Benefit rate	29.9	29.9	29.9	29.9	29.9
Expenditure-to-GDP ratio	7.3	7.3	7.7	9.3	11.6
United States I:[a]					
Dependency rate	19.2	19.0	20.4	27.6	36.8
Benefit rate	32.9	32.9	32.9	32.9	32.9
Expenditure-to-GDP ratio	6.3	6.2	6.7	9.1	12.1
United States II:[b]					
Dependency rate	19.2	18.7	19.1	24.8	31.9
Benefit rate (1995)	32.9	32.9	32.9	32.9	32.9
Expenditure-to-GDP ratio	6.3	6.2	6.3	8.2	10.5

Sources: OECD Social Expenditure (SOCX) database; OECD (1997); and Bosworth and Burtless (1998b).

Note: Expenditure-to-GDP ratio = [(dependency rate)(benefit rate)]/100.

[a] World Bank demographic projections.

[b] SSA demographic projections.

more than 17 percent of GDP. The shares in 2030 are considerably lower in the remaining four countries, primarily because they start with lower shares, although, even for these countries, there is close to a doubling of the share of the economy devoted to state pensions. Japan is an interesting case because the aging of its population leads the other countries but the

Table 7.3 **Pooled OLS Regression for State Pension Expenditure as a Share of GDP, OECD Countries, 1980–95**

	Dependent Variable = Log(Pension Expenditure/GDP)				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Log(elderly dependency rate)	1.64	1.63	1.63	1.64	0.20
	(24.94)	(19.57)	(19.23)	(24.50)	(1.98)
Log(GDP per capita)		0.01	−0.06		
		(0.08)	(−0.73)		
Log(urbanization rate)			0.11		
			(1.06)		
Log(female share of labor force)			0.22		
			(1.03)		
Time dummies				Yes	
Country dummies					Yes
Constant	−3.10	−3.14	−3.85	−3.16	1.07
Adjusted R^2	0.65	0.64	0.64	0.63	0.96
No. of observations	343	343	343	343	343

Note: *t*-statistics are given in parentheses.

severity of its problem is still notably less than the large continental European countries by 2030.[13]

These mechanical projections are based on the assumption that the cost rate rises at the same rate as the elderly dependency rate. To get a better sense of how the cost rate has varied with the dependency rate across the OECD over the recent past, I used a simple log-linear OLS regression using the SOCX data for a pooled sample of OECD countries for the period 1980–95. The basic regression equation is

$$(3) \quad \log\left(\frac{\exp}{\text{GDP}}\right)_{it} = \text{Constant} + \beta \log\left(\frac{\text{population} \geq 65}{15 \leq \text{population} \leq 64}\right).$$

The results are reported in table 7.3, and the implied relation between the elderly dependency rate and old-age cash benefits as a share of GDP is shown in figure 7.2. The coefficient on the demographic variable is highly significant in the regressions without country dummies.[14] The addition of other potential determinants of generosity—GDP per capita, the share of the population living in urban areas, and the share of women in the labor force—has little effect on the size or significance of the demographic vari-

13. OECD projections for Japan after 2030 indicate that the share of state pension expenditure continues to rise until 2050, reaching about 16 percent of GDP (OECD 1997). For the other G7 countries, the OECD projections show a leveling off or even a fall in this share after about 2040.

14. With country dummies, the coefficient is significant at the 5 percent level, but the size of the coefficient on the dependency-rate variable is much smaller.

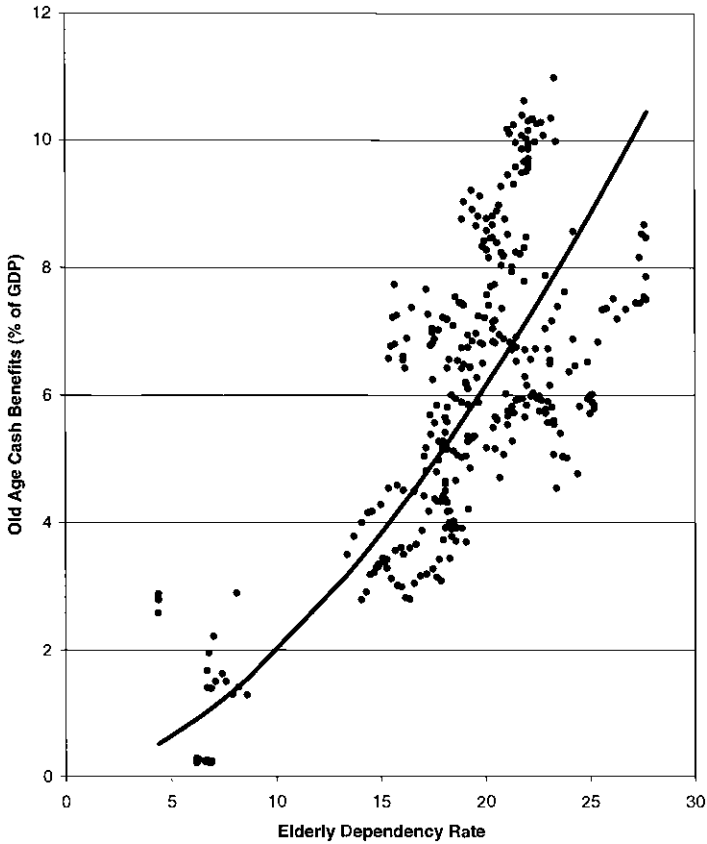


Fig. 7.2 Aging and public pension spending, OECD countries, 1980–95
Note: Regression line: Pension Exp./GDP = 0.045 (Dependency Rate)$^{1.64}$. See regression (1) in table 7.2.

able. The regressions (without country dummies) show that a 10 percent higher elderly dependency rate is associated with a more than 16 percent higher expenditure-GDP ratio. This nonlinear relation might be explained by the increased political influence of the elderly as they grow in numbers—an influence that is surely set to grow. However, given what this relation implies about the future share of total income going to state retirement benefits, it is hard to believe that such a relation can persist. For instance, if this relation were to hold for Italy, the share of old-age cash benefits alone would rise to 36 percent of GDP by 2030! Nonetheless, the regression results do suggest how difficult a task it will be to hold the growth in the expenditure share below the growth in the elderly dependency ratio.

The main focus so far has been on recent trends in state pension spend-

Table 7.4 **OECD Estimates of the Effect of Legislated Reforms—Percentage Change in Expenditure-to-GDP Ratios Relative to 1995 Ratio**

	% Change			
	2000	2010	2020	2030
Canada:				
Assuming constant 1995 benefit rate (from table 7.1)	2.6	14.9	60.0	120.3
OECD estimates given the effect of legislated reforms	−3.8	1.9	32.7	73.1
France:				
Assuming constant 1995 benefit rate (from table 7.1)	1.6	5.9	39.1	68.4
OECD estimates given the effect of legislated reforms	−7.5	−8.5	9.4	27.4
Germany:				
Assuming constant 1995 benefit rate (from table 7.1)	10.9	41.1	64.9	129.2
OECD estimates given the effect of legislated reforms	3.6	6.3	10.8	48.6
Italy:				
Assuming constant 1995 benefit rate (from table 7.1)	13.9	34.1	61.1	107.5
OECD estimates given the effect of legislated reforms	−5.3	−0.8	15.0	52.6
Japan:				
Assuming constant 1995 benefit rate (from table 7.1)	19.2	61.9	110.9	118.3
OECD estimates given the effect of legislated reforms	13.6	45.5	87.9	103.0
United Kingdom:				
Assuming constant 1995 benefit rate (from table 7.1)	0.3	6.1	28.3	59.1
OECD estimates given the effect of legislated reforms	0.0	15.6	13.3	22.2
United States:				
Assuming constant 1995 benefit rate (from table 7.1)	−1.2	6.1	43.5	91.4
OECD estimates given the effect of legislated reforms	2.4	9.8	26.8	61.0

Source: OECD (1997); and author's calculations.

Note: The measure of pension expenditure used in OECD (1997) for their estimates does not exactly match the measure based on all state old-age cash expenditures from the OECD Social Expenditure (SOCX) database used in table 7.1. Thus, the comparison of percentage changes with and without legislated reforms should be seen as indicative only. Both sets of estimates are based on the World Bank demographic projections.

ing and the future implications for this spending if current levels of generosity are maintained. The picture of limited reform hides the anticipated effect of already-legislated changes on future benefits and thereby on future generosity. In the next section, I attempt to estimate the effect of these reforms on social security wealth for certain stylized individuals and households. Before doing so, it is instructive to look at the projected aggregate implications of the legislated future changes. This is done in table 7.4. For each country, the first line shows the percentage change in the expenditure-GDP ratio for various years relative to the level of that ratio in 1995. The second line shows the OECD projections of the percentage change in the ratio *taking into account changes to benefit rules that have already been legislated.* Caution must be used in interpreting this comparison since the definitions of state pensions used do not coincide exactly (see the note to the table). The basic trend is clear, however: already-legislated

changes appear to have significantly curbed the future expansion of state pensions as a share of the economy. What are these legislated changes? And what effect do they have on the benefits that people can expect to get when they retire? I provide tenative answers to these questions in the next section.

7.2 Recent Reforms and Their Effect on Social Security Wealth

7.2.1 Assumptions

My goal in this section is to get a sense of the magnitudes of changes to SSW that have resulted from recent reforms. Of course, a given reform will affect different people differently, depending on such factors as gender, age, dependents, place in the earnings distribution, age-earnings profile, and so on.

The approach that I adopt is to look at the effect on some "average" households. Characterizing these individuals requires a number of assumptions and thus should be seen only as suggestive of the effect of the reform on workers around the middle of the earnings distribution. I make six main assumptions:

1. The worker earns the average production wage (as defined by the OECD) at age forty-five.[15]

2. The worker's age-earnings profile is based on that estimated by Mincer (1974; see also Berndt 1991, chap. 5) using cross-sectional U.S. data.[16] Mincer's cross-sectional estimate is combined with assumption 1 and data on real earnings/wage growth from the 1995 IMF *International Financial Statistics* (or the 1995 World Bank *World Tables* for Italy) to produce a stylized age-earnings profile.[17] It is important to have some estimate of the age-earnings profile since different countries use different averaging procedures in assessing relevant lifetime earnings.[18]

3. Expected length of retirement (assuming retirement at the standard

15. The OECD (*Tax/Benefit Position of Production Workers,* 1995 or earlier editions) defines an *average production worker* (APW) as an adult full-time production worker in the manufacturing sector whose earnings are equal to the average earnings of such workers (male and female). The values for the wage of an APW are taken from various editions of the OECD publication *The Tax/Benefit Position of Production Workers.*

16. The assumed profiles are based on the following equation: ln earnings $= k + 0.081$ Age $-$ 00012 Age^2. To determine the value of k, the earnings of an APW and an age equal to forty-five are substituted into the equation. Given this value of k, the profile is traced out by varying the age.

17. Real earnings growth is based on actual numbers up to 1996. From 1997 on, real earnings are assumed to grow at a rate of 1 percent per year for all countries.

18. The limitations of this assumption are obvious enough. First, age-earnings profiles differ between countries, depending, in part, on such institutional features as union density and deferred-compensation arrangements. Second, age-earnings profiles tend to be steeper for high than for low lifetime earners. Indeed, the hump-shaped profile that I assume tends to be more pronounced for low-income workers.

retirement age) is based on average life expectancy for workers of given ages at the age at the time of the reform and is taken from United Nations (1996) or OECD, (1998b).

4. The household is not entitled to any means-tested retirement benefits. This allows us to concentrate on universal flat-rate benefits and earnings-related benefits. Since I concentrate on workers earning the average production wage, this is probably realistic in most cases. Clearly, my estimates are a poor guide to the effect of reforms on low-income individuals, for whom means-tested benefits are likely to provide a significant portion of their retirement income.

5. The worker retires at the standard retirement age and has sufficient years of contributions to be eligible for full (flat and earnings-related) social security benefits. The worker is not affected by maximum or minimum limits for earnings-related pensions.

6. The real discount rate for discounting future benefits is 3 percent.

With these assumptions, I look at the effect of the reforms on the SSW of single men and women who are forty-five at the time of the reform. For the countries where a non-means-tested dependent spouse allowance is available, I also note the effect on a forty-five-year-old man with a dependent spouse. In addition, I look at the effect of the same reforms on men and women at their respective standard retirement ages, again assuming that these individuals earned the average production wage when aged forty-five.

7.2.2 Stylized Benefit Formulas and Their Use in SSW Calculations

Formulas for calculating retirement benefits differ significantly from country to country. Nonetheless, there are a number of common elements. I focus on three: the standard retirement age (R); the calculation of the benefit at the time of retirement; and the postretirement indexation of benefits. Of these, the calculation of the initial benefit is the least straightforward. Following the approach of OECD (1988), I model the calculation of the initial benefit as the sum of a flat-rate (lump-sum) benefit and an earnings-related component. The benchmark benefit equation at the initial retirement age is

$$B(R) = B_f + \beta E^a, \tag{4}$$

where $B(R)$ is the benefit at retirement age R, B_f is the flat-rate benefit, β is the replacement rate, and E^a is assessed earnings.[19] E^a is some function

19. The concept of the replacement rate—i.e., the relevant earnings that are to be replaced—being used here is thus country specific. Since most countries under study use earnings over a significant portion of the worker's like in the calculation of assessed earnings, the replacement-rate concept is typically close to the fraction of lifetime earnings that are being replaced. The significant exception is Italy before the 1992 reform, where assessed earnings are based only on the earnings for the five years prior to retirement.

of the annual earnings of the various years of the individual's working life. There are two key elements to this calculation: first, the years that are included and, second, how the earnings are revalued on the basis of average earnings growth. Other things equal, the greater the weight given to peak earning years (roughly the worker's fifties given my assumed age-earnings profile), and the more completely earnings are revalued in line with national earnings growth (assuming that this is positive), the more generous is the benefit formula.

Once the initial benefit is set, I assume that future benefits can be calculated on the basis of a simple indexation rule. The benefit h years into retirement is given by

$$B(R + h) = B(R) \prod_{t=R+1}^{R+h} [1 + i(t)], \tag{5}$$

where $i(t)$ is the real indexation factor for year t. When benefits are indexed to consumer prices, the benefit will be constant in real terms.[20] When benefits are indexed to nominal wages, the benefit will rise at the rate of real wage growth.[21]

My approach is to calculate gross social security wealth (SSW) for a given benefit formula viewed from a given age, T, during the worker's life. SSW is the present discounted value of implied future benefits, evaluated at the given point in the worker's life. Looked at from this age, SSW is affected by changes in the retirement age, the benefit formula, and the postretirement indexation of benefits (in addition, of course, to the discount rate for future cash flows and the expected years of retirement). This simplified case should give us an idea of the magnitude of wealth changes brought about by changes in the definition of benefit rules.

Letting H be the duration of retirement and d the discount rate, the equation for SSW at age T is

$$\mathrm{SSW}(T) = \sum_{h=0}^{H} \frac{B(R + h)}{(1 + d)^{R-T+h}}. \tag{6}$$

This formula calculates SSW on the basis of the simplification that the length of remaining life is known with certainty, where that length is set equal to the average remaining life for someone of age T. Of course, a person's remaining life is rarely known with certainty. In the appendix, I discuss how a certain life-span assumption can lead to a biased estimate of SSW when the length of remaining life is uncertain.

20. From the vantage point of a given age during the worker's life, the discounted real benefit falls with the length of the individual's retirement.

21. The real discounted benefit will rise (fall) with the length of the retirement if the real wage grows at a faster rate (slower rate) than the discount rate.

7.2.3 Recent Benefit-Formula Reforms in the G7 Countries and Their Effect on SSW

Over the last decade and a half or so, six of the seven major industrialized countries have significantly redefined their retirement-benefit formula. The exception is Canada. Among the six, the reforms that I consider are France (1993), Germany (1992), Italy (1992), Italy (1995), Japan (1994), the United Kingdom (1986), the United Kingdom (1994), and the United States (1983).[22] These reforms range from the relatively major (e.g., Italy [1992, 1995] and the United Kingdom [1994]) to the relatively minor (e.g., Japan [1993] and the United States [1983]).

The stylized benefit formulas prevailing prior to the reforms and used in the calculations are outlined in table 7.5. Table 7.6 then outlines the reforms. It is worth noting once again that I am focusing on only a subset of possible reforms, to wit, changes to the standard retirement age, the initial benefit formula for a worker earning the average wage with a full contribution record, and the postretirement indexation of benefits. For example, the effects of changes in eligibility conditions for a full pension, in the maximum or minimum pension, in the generosity of and eligibility for means-tested benefits, in early retirement benefits and conditions, in accrual rates for later retirements, and so on are not included.[23]

As can be seen from the first column of table 7.4, a number of countries (Germany, Italy, Japan [tier 1 benefits], the United Kingdom, and the United States) have raised their standard retirement age, although typically with a long lead time. There has also been a tendency for a convergence of the standard retirement ages for men and women (Germany, the United Kingdom, and Italy [Dini reforms]). Thus, we will see that women tend to lose more wealth from the reforms than identically situated men.

France, Italy (Amato reforms), and the United Kingdom have also significantly changed the way they assess "average earnings" for their earnings-related pensions. In its 1986 reform, the United Kingdom also reduced its replacement rate from 25 to 20 percent. The Dini reforms in Italy went even further, by moving from an average-earnings-based method for calculating benefits to a contribution-based method.[24] Beyond its effect on SSW, this reform has the potential of reducing labor market distortions by strengthening the link between contributions made and benefits received, thereby making contributions seem less like a tax. This

22. Since the mid-1980s, a number of other OECD countries have also reformed their defined-benefit retirement systems. Significant reforms were introduced in Australia (1992), Austria (1985, 1988, 1993), Greece (1990, 1992), Portugal (1993), and Sweden (1994).

23. The benefit streams are calculated before taxes. Since the 1983 U.S. reform included a major change in the tax treatment of benefits, I also estimate the effect on the stream of net of tax benefits for that reform.

24. Sweden is also moving toward such a notional defined-contribution system.

Table 7.5 **Stylized Benefit Formulas Prior to Recent Reforms**

	Retirement Age (men/women)	Tier 1, Flat-Rate Benefit	Tier 2, Assessed Earnings for Earnings-Related Pension	Tier 2, Replacement Rate[a]	Tier 2, Postretirement Indexation
France (1993)—*regime general*[b]	60/60	No universal flat-rate benefit (a means-tested benefit does exist)	10 highest years, revalued for nominal wage inflation	50%	Gross wage inflation
Germany (1992)	63/60	No universal flat-rate benefit (a means-tested benefit does exist)	Average earnings, revalued for nominal wage inflation	60% (based on 40 years of coverage at 1.5% per year)	Gross wage inflation
Italy (1992)—prior to Amato reforms	60/55	No universal flat-rate benefit (a means-tested benefit does exist)	Last 5 years of earnings; earnings for first 3 years indexed for inflation	Progressive formula; 80% of wage of APW	Gross wage inflation
Italy (1995)—prior to Dini reforms	65/60 (being phased in)	No universal flat-rate benefit (a means-tested benefit does exist)	Lifetime earnings (being phased in)	Progressive formula; 80% of wage of APW	Price inflation
Japan (1994)	60/60 (effective)[c]	National pension program—old-age basic pension: 737, 300 yen per year ($5,967.62)	Average lifetime earnings, revalued for nominal wage inflation	30% (based on 40 years of contributions at 0.75% per year)	Tier 1: price inflation; tier 2: gross wage inflation[d]

United Kingdom (1986)	65/60	Old-age pension: basic component £1,861.60 ($2,233.92)	Average earnings (between upper and lower limits) of best 20 years, revalued for nominal wage inflation	25%	Price inflation
United Kingdom (1994)	65/60	Old-age pension: basic component £2,185.80 ($4,266.36)	Average earnings (between upper and lower limits)[e] of working life, revalued for nominal wage inflation	20%	Price inflation
United States (1983)	65/65	No universal flat-rate benefit (a means-tested benefit—SSI—does exist)	Average covered earnings of best 35 years, revalued for nominal wage inflation	Progressive formula, 43% at APW based on 1983 bend points	Price inflation

Sources: Disney (1996), Franco and Munzi (1996), Hamann (1997), Leibfritz et al. (1995), OECD (1988), Takayama (1996), SSA, *Social security programs throughout the world* (various editions); Kalisch and Aman (1997); and Roseveare et al. (1996).

[a]Assuming full eligibility for an earnings-related pension.

[b]Most of the population is covered by a two-pillared system comprising the *regime general* and a complementary scheme organized on a socioprofessional basis. Analysis of the French system is complicated by a number of *regime speciaux,* which substitute for the *regime general* for some workers. The 1993 reform was limited to the *regime general* and some related schemes, so I concentrate on that plan here.

[c]The formal retirement age for tier 2 benefits is 65, but workers can retire at 60 without loss of benefits (see Takayama 1996).

[d]Updated every five years rather than annually.

[e]The upper and lower limits are indexed to price inflation.

Table 7.6 **Selected Reforms to State Retirement-Income Systems**

	Retirement Age	Tier 1, Flat-Rate Benefit	Tier 2, Assessed Earnings for Earnings-Related Pension	Tier 2, Replacement Rate	Tier 2, Postretirement Indexation
France (1993)			Assessment period, 10 → 25 years (phased in by 2008)[a]		Wage indexation → price indexation[b]
Germany (1992)[c]	Men: 63 → 65 years (by 2009); women: 60 → 65 years (by 2018)				Gross wage indexation → net wage indexation
Italy (1992) Amato reforms	Men: 60 → 65 years (over 10 years); women: 55 → 60 years (over 10 years)		Assessment period: 5 → 10 years (over 10 years); lifetime for younger workers; reevaluation of past earnings: inflation plus 1%		Wage indexation → price indexation
Italy (1995) Dini reforms			Lifetime earnings, revalued at inflation plus 1% → contributions over working life, revalued at the growth rate of a 5-year moving average of nominal GDP	New system:[d] for those retiring at 65, benefits are equal to 6.1% of capitalized contributions; smaller coefficients apply to earlier retirements.[e]	
Japan (1994)	60 → 65 years, for tier 1 pensions (by 2014 for men and by 2019 for women)				Gross wage indexation → net wage indexation for tier 2 pensions
United Kingdom (1986)[f]			Assessment period, 20 best years → all working years	25% → 20% (phased in for those reaching retirement age between 1999 and 2009)	

United Kingdom (1994)	60 → 65 years for women (phased in by 2020)	Lower earnings limit (LEL) in year prior to retirement subtracted from revalued earnings → revalued LEL subtracted from revalued earnings[g] (starting in 2000)		
United States (1983)[h]	65 → 67 years by 2022 (for workers reaching the early retirement age of 62)		Benefits not subject to income tax → benefits subject to income tax in certain circumstances[i]	One-time 6-month delay in the cost-of-living adjustment

Sources: Disney (1996), Franco and Munzi (1996), Hamann (1997), Leibfritz et al. (1995), OECD (1988), Takayama (1996), SSA, *Social security programs throughout the world* (various editions); Kalisch and Aman (1997); and Roseveare et al. (1996).

[a]In addition, the number of years required for a full pension is to be gradually raised from 37½ years to 40 years.

[b]In fact, pensions had been indexed to prices since 1987, with wage indexation being suspended on a yearly basis. The reform institutionalized the new indexation procedure.

[c]Other reforms not included here include more strict rules on early retirement, reduced pension credits for years in higher education, and increases in pensions for low-age workers.

[d]Since employees pay a higher contribution rate than the self-employed, the shift from average-earnings-based benefits to contributions-based benefits means that the reform has a more negative effect on the self-employed. Employees currently face a contribution rate of 32%, as compared to a 15% rate for the self-employed. In fact, the benefits are calculated using "notional" contribution rates of 33% and 20% for employees and the self-employed, respectively. Thus, even though the self-employed take a bigger hit from the change of system, they continue to receive a subsidy (see Hamann 1997).

[e]For those retiring at 60, the coefficient is 5.1%. The earliest allowable retirement age is 57, at which the coefficient drops to 4.7% (Hamann 1997). The stated intention is that these coefficients will be periodically adjusted downward in response to lengthening life expectancy.

[f]Other reforms of the earnings-related pension (SERPS) include a reduction of the survivor's pension from 100% to 50% of the pension that was to be paid to the deceased contributor and an extension of arrangements for contracting out of earnings-related pensions.

[g]The lower earnings limit (LEL) is set equal to the flat-rate basic benefit and is thus adjusted only for price inflation. When real wage growth is positive, this seemingly minor technical adjustment can lead to a substantial benefit cut over time (see Disney 1996).

[h]Other reforms not treated here include increased taxation of benefits, expansion of the program to include new federal employees, and a small payroll-tax increase.

[i]If a taxpayer's combination of adjusted gross income, interest on tax-exempt bonds, and 50% of social security benefits exceeds certain threshold amounts, benefits equal to the lesser of 50% of benefits or 50% of combined income over the threshold amount is subject to income tax. The additional revenue is added to the trust funds. The taxation of benefits was further modified in 1993, when a secondary (higher) threshold was introduced. An amount equal to 85% of combined income over the secondary threshold is now added to the benefits that are subject to income tax. The additional tax revenues are added to the Medicare health insurance trust fund.

reform will have quite different effects on employees than on the self-employed. The reason is that the self-employed faced lower contribution rates under the old system and that the shift to a contribution-based system will therefore hurt them more.

A number of countries have also changed the way they index benefits after retirement. France and Italy have shifted from wage indexation to price indexation, which leads to cumulative benefit cuts over time when real wages are growing. Germany and Japan (for its tier 2 pensions) have changed from gross wage indexation to net wage indexation. Given that contribution rates are expected to grow over time to meet rising benefit costs, this reform is also a form of benefit cut. Tax-rate projections are difficult to make, but, given that payroll-tax rates must rise substantially (even with recent benefit reforms), it is important to allow for the slower growth of net real wages in the calculations. In Germany, the payroll tax is projected to rise from 18.9 percent in 1995 to 27 percent in 2030.[25] If we assume that the gross real wage rises at an average annual compound rate of 1 percent, this implies that the net real wage (assuming that nonpayroll taxes remain constant) rises at a rate of 0.7 percent. For Japan, the contribution rate is projected to rise from 16.5 percent in 1995 to 29.5 percent in 2030.[26] If we again assume 1 percent real wage growth (and constant nonpayroll taxes), this implies that the net real wage rises at the rate of 0.5 percent per year over this period.

Table 7.7 contains the estimates of the changes in the present value of SSW for single men and women who are forty-five at the time of the reform and are earning the average production wage. I assume that all the reforms are fully phased in by the (new) standard retirement age. In most cases, this is accurate, but, in some cases, the lead times are so long that the reforms are still a long way from being fully phased in (e.g., the Italian and U.S. reforms). Given the previously noted differential effect on employees and the self-employed of the second set of Italian reforms, I include separate estimates of the change in SSW for these two types of worker.

The estimated losses in SSW are substantial, although, as noted above, the range is quite large. The largest change is for men after the 1992 Italian reforms (−38 percent).[27] Other big losses occurred for women in the German, Italian, and U.K. reforms. More generally, the effect on SSW tends to be especially large when there is a change in the retirement age and

25. Franco and Munzi (1996), based on estimates made by Germany's Social Advisory Board in 1994.

26. These estimates are taken from Takayama (1996).

27. Male Italian employees retiring at the standard retirement age appear to have gained back some wealth in the 1995 reforms. On the other hand, women and the self-employed—especially the latter—suffered further losses in this second round of reforms. Moreover, Hamann (1997) estimates that male employees retiring before sixty-three are also net losers.

Table 7.7 **Effect of Selected Benefit Reforms on Social Security Wealth (SSW)—Forty-Five-Year-Old Worker Earning the Average Production Wage (assuming reforms are fully phased in by standard retirement age)**

	Average Production Wage (APW)	Prereform SSW as % of APW	Postreform SSW as % of APW	Change in SSW as % of APW	% Change in SSW
France (1993) (francs):					
Men	113,200	543	469	−74	−13.5
Women	113,200	680	576	−104	−15.3
Germany (1992) (deutschemarks):					
Men	49,904	354	328	−26	−7.3
Women[a]	49,904	596	438	−158	−26.2
Italy (1992) (lire):					
Men	28,302,000	841	525	−316	−38
Women	28,302,000	1374	975	−399	−29
Italy (1995) (lire):[b]					
Men (retiring at 65):					
Employee	31,599,600	470	580	+110	+23
Self-employed	31,599,600	470	352	−118	−25
Women (retiring at 60):					
Employee	31,599,600	791	717	−74	−9
Self-employed	31,599,600	791	420	−371	−45
Japan (1994) (yen):[c]					
Men[d]	4,064,645	447	381	−66	−14.8
Women	4,064,645	568	495	−73	−12.4
United Kingdom (1986) (pounds):					
Men[e]	9,118	229	177	−52	−22.8
Women[f]	9,118	469	390	−79	−16.9
United Kingdom (1994) (pounds):					
Men[g]	14,607	201	192	−9	−5
Women	14,607	374	265	−109	−29
United States (1983) (dollars):[h]					
Men[i]	18,357	163	123	−40	−24.6
Women[j]	18,357	250	210	−40	−16.0

[a] The postreform numbers are based on the assumption that the increase in the retirement age is fully phased in by the time the worker retires. Since the increase in the retirement age for women (to 65 from 60) is not due to be fully phased in until 2018, these calculations overstate the effect on a worker who is 45 at the time of the reform.

[b] This reform will affect employees and the self-employed very differently, so the effects on the SSW of these different types of workers are included separately. The reason for the differential effects is that the self-employed pay a much lower contribution rate than do employees. Thus, a shift to contribution-based benefits has a larger negative effect on the implicit wealth of this group.

Postreform calculations are based on a real GDP growth rate of 1.5 percent.

(*continued*)

Table 7.7 (continued)

[c] These calculations are made on the assumption that the worker retires at age 60 but after the reform does not receive tier 1 benefits until age 65. If the reform leads retirement to be postponed until age 65, then the benefit losses are larger. Under this assumption, the benefit losses for men and women are 34.9 and 28.7 percent, respectively.

[d] A married man with a dependent spouse received benefits with a present value equal to 502 percent of the wage of an APW before the reform and equal to 411 percent after the reform (an 18.1 percent reduction in SSW).

[e] A married man with a dependent spouse received benefits with a present value equal to 288 percent of the wage of an APW before the reform and equal to 236 percent after the reform (an 18.2 percent reduction in SSW).

[f] The postreform numbers are based on the assumption that the increase in the retirement age is fully phased in by the time the worker retires. Since the increase in the retirement age for women (to 65 from 60) is not due to be fully phased in until 2020, these calculations overstate the effect on a worker who is 45 at the time of the reform.

[g] A married man with a dependent spouse received benefits with a present value equal to 267 percent of the wage of an APW before the reform and equal to 258 percent after the reform (a 3 percent reduction in SSW).

[h] The postreform numbers are based on the assumption that the increase in the retirement age is fully phased in by the time the worker retires. Since the increase in the retirement age to 67 is not due to be fully phased (for a worker reaching the early retirement age of 62) until 2022, these calculations overstate the effect on a worker who is 45 at the time of the reform.

[i] A married man with a dependent spouse received benefits with a present value equal to 224 percent of the wage of an APW before the reform and equal to 196 percent after the reform (a 20.0 percent reduction in SSW).

If the income of the retiree is high enough that the 50 percent of benefits are now subject to income taxation, then the loss of SSW rises to 30.2 percent.

[j] If the income of the retiree is high enough that the 50 percent of benefits are now subject to income taxation, then the loss of SSW rises to 22.3 percent.

when there is a shift from wage to price postretirement indexation.[28] Given their longer expected duration of retirement, the effect of the latter reform on women tends to be greater than the effect on identically situated men. In addition, given that the women in some cases had a lower standard retirement age prereform, they have been disproportionately targeted for standard-retirement-age increases in Germany and the United Kingdom.[29] The German reform led to just a −7.3 percent change in SSW for men and a −26.2 percent change for women. The corresponding numbers for the 1994 reform in the United Kingdom are −5 and −29 percent. On the other hand, an equal increase in the retirement age for men and women tends to hurt men proportionately more. The reason is simply that men have shorter life expectancies and that the lost benefits therefore represent a larger fraction of the present discounted value of the prereform benefit stream. For example, the increase in the retirement age that took place as part of the U.S. reform reduces the SSW of men by almost one-quarter

28. Both were part of the Italian reform in 1992.

29. The shift to a contribution-based system with declining coefficients for earlier retirements in the second Italian reform also disproportionately hurts women, given their earlier retirement age under the older system.

while reducing the SSW of women by 16 percent. These estimates are based on average life expectancy for a forty-five-year-old in the United States at the time of the 1983 reform, which was twenty-nine years for men and thirty-four years for women. If retirement takes place at the standard retirement age (sixty-five prior to the reform), these life expectancies imply prereform expected retirements of nine and fourteen years for men and women, respectively. Raising the standard retirement age to sixty-seven and continuing to assume that retirement takes place at the standard retirement age lower the expected retirement by two years for both men and women. Given the relatively short expected retirement for men to begin with, the loss of two years means a large percentage cut in the present discounted value of benefits.

Of course, retirement does not always take place at the standard retirement age. Indeed, Gruber and Wise (1998) document that, in many countries, *most* retirements take place before the standard age, with a large number of people leaving the labor force at the earliest possible date that they can receive benefits. For a number of countries, they also document significant use of disability and unemployment-benefit programs to finance early retirement even when state pension benefits are not available. Given this behavior, it is less clear how raising the standard retirement age affects SSW. For someone who retires before the standard retirement age and continues to retire at the same age after the standard retirement age has risen, we need to know how the increase in the standard retirement age affects the benefits for those taking advantage of early retirement. To take the United States as an example once again, retirement benefits are available as early as age sixty-two. Workers availing themselves of early retirement benefits, however, receive just 80 percent of the annual benefit that they would have received had they waited until age sixty-five. As we have seen, the 1983 reform will eventually increase the standard retirement age to sixty-seven, but a worker will still be allowed to retire at sixty-two with permanently reduced benefits. The benefit penalty for early retirement is now 30 percent rather than 20 percent, however. By itself, this implies a benefit cut (for men and women) of 12.5 percent. For men in particular, this is a smaller cut than the close to 25 percent cut (which was predominantly due to the increase in the standard retirement age) reported in table 7.7. This demonstrates how the results are sensitive to the assumption that we make about retirement behavior, and the reported estimates of the effects of raising standard retirement ages probably reflect the upper bound of the negative effects of such reforms.

The second to last column of table 7.7 also reports the change in SSW as a fraction of the APW. This figure gives us another way of gauging the effect of the reform on the worker. For example, the first number in the column can be interpreted as saying that the 1993 reform of the general regime in France reduced the present discounted value of future benefits (measured in 1993 money units) by an amount equal to 73 percent of the

wage of a French APW in 1993. On this measure, the first of the Italian reforms is shown to have been especially severe, reducing SSW (if fully phased in) by more than three times the wage of an APW for both men and women.

Table 7.8 contains estimates of the effect of the reforms on those who retired in the year of the reform at the standard retirement age. With the exception of changes in the form of postretirement indexing, all the reforms in table 7.6 above are phased in and therefore do not affect the initial benefit of the newly retired. For the countries that switched from wage to price indexation—France and Italy—the estimated loss of SSW is between 6 and 11 percent, which is certainly not insignificant. Under the assumptions for tax increases discussed above, the shift from gross wage to net wage indexation—Germany and Japan—leads to cumulative losses of about 2–3 percent.

Although the estimates of wealth changes should be seen as indicative only, the difference between the effects on middle-aged and younger work-

Table 7.8 **Effect of Selected Benefit Reforms on Social Security Wealth (SSW)—Worker at Standard Retirement Age Who Earned the Average Production Wage at Forty-Five**

	% Change in SSW	Reason for Change
France (1993):		Wage indexation → price indexation
Men	−8.5	
Women	−10.0	
Germany (1992):		Gross wage indexation → net wage indexation
Men	−2.1	(assuming gross real wage growth of 1 percent and net real wage growth of 0.7 percent [see text])
Women	−2.8	
Italy (1992):		Wage indexation → price indexation
Men	−3.4	
Women	−11.2	
Italy (1995):		No change, given the long phase-in of reforms
Men	. . .	
Women	. . .	
Japan (1994):		Gross wage indexation → net wage indexation
Men	−2.5	(assuming gross real wage growth of 1 percent and net real wage growth of 0.5 percent [see text])
Women	−3.1	
United Kingdom (1986):		No change, given the long phase-in of reforms
Men	. . .	
Women	. . .	
United Kingdom (1994):		No change, given the long phase-in of reforms
Men	. . .	
Women	. . .	
United States (1993):		6-month cost-of-living adjustment freeze (assuming annual inflation of 3.5%)
Men	−1.7	
Women	−1.7	

ers, on the one hand, and those on the retired and those close to retirement, on the other, is striking. What accounts for this difference in treatment? One reason is almost certainly that those who are still some distance from retirement still have the opportunity to save for retirement and so are in a better position to adjust to the benefit cuts. Yet these adjustments will be painful nonetheless given the magnitude of wealth loss. Putting aside intergenerational altruism, why is it that middle-aged workers are willing to make these adjustments instead of forcing future workers to pay the previously promised benefits? The rhetoric of reform debates suggests that current workers fear that, with rising dependency ratios, overburdened future workers will redefine—or even completely eliminate—PAYGO benefit arrangements. With this in mind, the next section explores a simple model in which self-interested current workers can actually raise their expected benefits by cutting the benefits they promise themselves.

7.3 Repudiation Risk as an Inducement to Early Reform: A Simple Model

The reform case studies produced two main findings about benefit cuts: the currently retired and those close to retirement are usually spared, and middle-aged and younger workers can sometimes face large reductions in their implicit gross SSW. In this section, I briefly explore one explanation for these findings with a simple model. The idea behind the model is that workers bear a fixed cost when they cut the benefits of the old as well as bearing a (nonlinear) cost to paying them benefits. Benefit cuts are avoided unless benefits reach a level that makes it worthwhile to incur the fixed cost. Once benefits are cut, the cuts can be large. If current workers believe that the benefits that they are promising themselves will trigger future reform, then it will be in their interests preemptively to cut their own benefits.

This model relies on the self-interest of current workers to explain why they cut their own future benefits. There are, of course, other reasons to do so, such as a concern for the fairness of the intergenerational distribution (for a discussion of intergenerational accounting, see Kotlikoff [1992]) or a concern for economic efficiency (for an overview of the distortions caused by PAYGO social security, see Feldstein [1996]). The costs to current generations of reducing the unfunded liability of social security are often seen, however, as a major obstacle to reform. Thus, the model suggests how reforms that are considered good on more impartial grounds might still take place even in a world with quite partial individuals.

The model has the following main elements:

1. Current workers promise themselves social security benefits to be paid for by future workers. This is an inherited unfunded liability from the point of view of the future workers.

2. The actual level of benefits is chosen by future workers (say, because they have a majority). This represents political risk from the point of view of current workers. However, future workers face political (or repudiation) costs when they redefine the benefits that the retired had promised themselves, that is, when they repudiate part of the inherited liability. I assume that there is a fixed cost to repudiation and that the cost of repudiation rises linearly with the size of the benefit reduction. We will see that this gives current workers influence over the benefits that they will receive. (I take it that the political costs are sufficiently high to prevent cutting the benefits of the currently retired. Attention is thus on the decision of current workers about what benefits to promise themselves.)

3. The welfare loss to future workers of funding benefits rises nonlinearly with the PAYGO tax that they must pay.

To solve the model, I first determine the optimal choice of benefit reduction by the second generation of workers for a given level of the inherited unfunded liability. There will be some maximum level of benefit that they will choose not to repudiate at all. I show that this level is greater than the level that they would choose if they decide to repudiate. Given that current workers anticipate the responses of future workers (there is no uncertainty in the model), it follows that it is optimal for them to promise themselves benefits at this "maximum" level. If the promised benefits are currently higher than this level, it is in their interest to scale them back.

For simplicity, I assume that there is a single member in the (first) generation of current workers. Each generation lives for two periods, working in the first and retired in the second. The population grows at the rate n so that there are $1+n$ workers in the second generation. This implies that the dependency ratio, D, in the second period is equal to $1/(1+n)$.

There is a PAYGO social security system whereby the working generation is taxed and the tax revenue is paid out as a benefit to the retired. For a given actual benefit payment paid to the retired, $B(1)$, a tax of $D \times B(1)$ is levied on each worker to ensure budget balance.

The current worker knows that a future worker will have utility given by

$$(7) \quad u = k - \frac{a}{2}T^2 - D(F - c\Delta B) \quad \text{with repudiation (i.e., } \Delta B < 0),$$

$$u = k - \frac{a}{2}T^2 \quad \text{without repudiation (i.e., } \Delta B = 0),$$

where T is the per worker tax, F is the total fixed cost of repudiation, and ΔB is the change in benefits. Note that the adjustment cost $(F - c\Delta B)$ is multiplied by $D\ (= 1/[1 + n])$ to put it in per worker terms. Writing the benefit as the sum of the inherited unfunded liability, $B(0)$, and the change in that benefit, the constraint faced by the future worker is

$$T = DB(1) = D[B(0) + \Delta B]. \tag{8}$$

Assuming that the future worker does repudiate, I can find what the optimal repudiation will be by substituting the budget-balancing constraint into the utility function and maximizing with respect to ΔB. The optimal change in the benefit is

$$\Delta B = \frac{c}{aD} - B(0) \tag{9}$$

so that the actual benefit paid is

$$B(1) = \frac{c}{aD}. \tag{10}$$

The next step is to find out when the future generation will in fact repudiate. I assume that repudiation will take place if it increases utility (taking into account, of course, the costs of repudiation). The repudiation condition is then

$$\text{repudiate if} \quad k + \frac{1}{2}\frac{c^2}{a} - DF - cDB(0) > k - \frac{a}{2}D^2B(0)^2,$$

where I assume that

$$\frac{1}{2}\frac{c^2}{a} - DF < 0$$

(which implies that future workers have higher utility by not repudiating when the unfunded liability that they face is very low, as can be seen in fig. 7.1 above).

I now turn my attention to the current worker's choice of unfunded liability to place on the future worker. The current worker wants this to be as large as possible and so chooses the largest $B(0)$ that is consistent with no repudiation. This can be found by replacing the inequality in the repudiation constraint with an equality and solving the resulting quadratic for $B(0)$. The roots of this equation are

$$\frac{c}{aD} + \sqrt{\frac{2F}{aD}}$$

and

$$\frac{c}{aD} - \sqrt{\frac{2F}{aD}}.$$

Given that I have assumed that

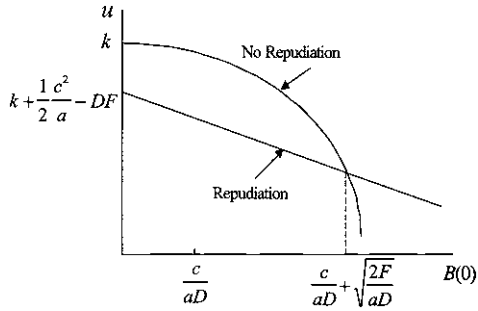


Fig. 7.3 Determination of the maximum future benefit consistent with no repudiation

$$\frac{1}{2}\frac{c^2}{a} - DF < 0,$$

the first root is positive and the second negative. If I rule out negative benefits, then the optimal unfunded liability to place on future workers is

$$B(0)^* = B(1)^* = \frac{c}{aD} + \sqrt{\frac{2F}{aD}}, \tag{11}$$

That is, the benefit is equal to the repudiation benefit plus a premium that is negatively related to the dependency ratio. The determination of the maximum future benefit consistent with no repudiation is shown graphically in figure 7.3.

The optimal benefit increases with c and F and decreases with a and D. Smaller repudiation costs or more distorting taxes will lower the feasible benefit for a given dependency ratio. Most important, an increase in the future dependency ratio, D, will cause current workers to cut the benefits that they promise themselves.

Figure 7.4 shows how the actual benefits paid, $B(1)$, correspond to the promised benefits, $B(0)$. The two rise together until the repudiation threshold is reached at

$$\frac{c}{aD} + \sqrt{\frac{2F}{aD}}.$$

At that level of the unfunded liability, repudiation occurs, and actual benefits fall to c/aD. This is a rather extreme form of debt "Laffer curve" (as discussed in Krugman [1993, chap. 7]). Debt "forgiveness" in the sense of voluntarily reducing the unfunded liability on the next generation can actually raise the benefits received, making both generations better off. The earlier generation receives higher benefits, and the latter generation avoids the unpleasantness of cutting or redefining benefits for the old.

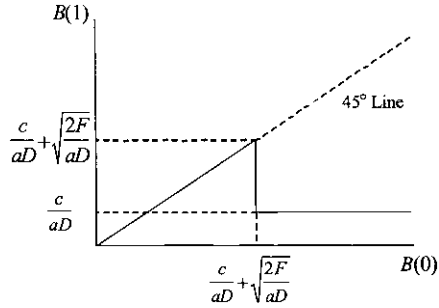


Fig. 7.4 Relation between promised benefit and actual benefit

We can use the PAYGO budget constraint to see how the tax rate changes with the dependency rate:

$$T^* = DB(1)^* = \frac{c}{a} + \sqrt{\frac{2FD}{a}}. \tag{12}$$

Given our assumptions, current workers know that future workers will be willing to bear part of the burden of an increase in the dependency ratio with higher tax rates. The marginal willingness of future workers to share the burden, however, decreases with the dependency ratio. In other words, when the dependency ratio (and thus the tax rate) is already high, their willingness to increase the tax rate further in response to an even higher dependency ratio is low.

In conclusion, this simple model produces three main results that are not inconsistent with recent reforms. First, repudiation on retirement-benefit obligations to the currently retired should not take place even when the dependency rate is high (assuming that this high rate was anticipated). Second, benefit promises should be reformed in anticipation of the high dependency ratio to prevent costly repudiations. And, third, an anticipated increase in the dependency rate should lead ultimately to a mix of lower benefits and higher taxes.

7.4 Concluding Comments

This paper has shown that, in response to projections of sharply rising costs of state-provided retirement income, governments have succeeded in legislating significant cuts in future benefits. In most cases, these cuts have not been enough to stabilize the share of GDP being spent by governments on retirement benefits, so it is reasonably safe to predict more benefit cuts if this approach to "saving" social security programs continues to be pursued. Although this paper has focused on attempts to scale back PAYGO

programs, I conclude with some comments on the alternatives to this approach to curbing the cost to future taxpayers.

There are two main competing approaches:[30] prefund (using current taxes) future defined-benefit obligations, or substitute privately prefunded defined-contribution (DC) accounts for these obligations (the IB option). What these approaches have in common is that they force current workers to pay for themselves what future workers were to have paid for. This is clear with the prefunding of existing obligations but a bit obscured under the privatization option. For the United States, where privatization has received a lot of attention, there appear to be two approaches to moving to an IB system. The substitution element is clearest in proposals to increase the payroll tax (or use the budget surplus) to fund accounts from which the proceeds would replace an increasing proportion of PAYGO benefits over time (see, e.g., Feldstein and Samwick 1998). The increase in the tax is temporary as the amount needed to fund existing defined-benefit (DB) obligations declines over time as these obligations are replaced by the proceeds from the DC accounts. The alternative approach is to shift some or all payroll taxes into the funding of private DC accounts and to fund remaining PAYGO obligations with a combination of government debt and increases in payroll and nonpayroll taxes (such as a consumption tax).[31] How much of the burden falls on current workers depends on the split between tax increases and debt finance.[32]

What I have stressed so far is how these reforms all place a burden on current workers partly to relieve the burden on future workers. One important difference between the cut-future-benefits and the substitute-current-funding approaches might be their effects on the adequacy of future retirement income. It is possible that current workers will respond to large cuts in the benefits that they are promised by raising their private saving, thereby maintaining their living standards (without having to work longer) in later life. But it seems unwise to rely on this. In the countries where future benefits rules have already been reformed substantially, do younger workers even know how much the benefits that they should be anticipating have fallen? The advantage of prefunding is that an alternative (albeit potentially uncertain) source of retirement income is put in place directly.

This brings me back to where I started and the fact that there is risk in

30. I ignore large-scale cuts in benefits to the currently or soon to be retired as an option.

31. For a proposal of this type, see Kotlikoff and Sachs (1997).

32. If current taxes are not raised at all, then future taxpayers are not being helped. Instead of having to meet unfunded social security obligations, they will have to meet government debt obligations. Thinking in terms of the model of sec. 7.3, however, there might be a difference in the willingness to repudiate on social security obligations and the willingness to repudiate on government debt. Thus, this form of asset swap could still benefit existing workers.

both IB and PAYGO systems. Although there are different ways to characterize the risk, one aspect is the possibility of having inadequate income in retirement. The main finding of this paper is that politically imposed changes in PAYGO benefit rules that have a large effect on the flow of benefits in retirement are not just a possibility—they have already occurred in a number of major economies. And, given that costs are still set to escalate substantially, it is almost certain that more are in store. The decision about partially or fully substituting an IB for a PAYGO system depends, of course, on more than just risk factors (notably, the effects on economic efficiency and inter- and intragenerational distribution). In considering reform options, however, the vulnerability of existing PAYGO defined-benefit rules must be kept in mind.

Appendix

A Note on the Bias Induced by the Certain-Length-of-Life Assumption

How serious a limitation is the assumption of a certain remaining lifetime? In general, the expected SSW of someone with an uncertain remaining lifetime with an expected duration of $R - T + H$ years is *not* the same as the SSW of someone with a certain remaining lifetime of that length. The two are equal under the following restrictive conditions: the real discounted annual benefit is constant over time (this requires that real benefits grow at a rate equal to the real discount rate), and the worker is certain to reach retirement age.

The first assumption implies that SSW is a linear function of the length of retirement. If the worker is certain to reach the retirement age but the discounted real benefit falls over time so that SSW rises at a decreasing rate with the length of retirement, then SSW will be lower under the uncertain-lifetime assumption.[33] In other words, the estimate of SSW based on the certain-remaining-lifetime assumption is biased upward. On the other hand, if the discounted real benefit rises over time (which will be the case if benefits grow at a faster rate than the discount rate), then the estimate is biased downward.

33. The reasoning here is similar to that which shows that expected utility is less than the utility of the expected income for a risk-averse individual. A risk-averse individual has diminishing marginal utility in income. In the case considered here, the individual has diminishing marginal SSW in the number of years of retirement. Given this, and assuming that the individual is certain to reach retirement, then the expected SSW is less than the SSW at expected remaining length of life.

A further complication is added if there is a positive probability of not surviving until retirement age. A simple example of a linear SSW schedule is shown in figure 7A.1. Given the constant discounted real benefit, SSW is higher under the uncertain-lifetime assumption. The worker will live to A_0 with probability p or A_1 with probability $1 - p$, which I assume leads her to expect to live until $R + H$. Note that A_0 is less than R, so there is a positive probability of not reaching retirement age. The expected SSW given the uncertain length of life is SSW^u, which is a probability-weighted average of the zero benefits that are received if the worker does not survive until retirement and the present discounted value of benefits if she survives until A_1. Inspection of the diagram reveals that this level of SSW is greater than the SSW of someone who is certain of dying at age $R + H$ (SSW^c in fig. 7A.1).[34] Thus, the possibility of dying before retirement tends to bias the estimate of social security wealth upward. Our primary concern, however, is with the percentage change in social security wealth that results from a benefit reform rather than with the actual levels of wealth, and there is some reason to hope that the bias is smaller for this calculation. In the case of a linear SSW schedule, for example, a change in the level of the (constant) discounted real benefit level will lead to an equal percentage change in SSW under the certain- and the uncertain-lifetime assumptions.[35]

Summing up, the assumption of the fixed-remaining-length-of-life assumption does introduce a potential bias in estimates of SSW. It is not obvious, however, which way the bias goes. A positive probability of not reaching retirement leads to a downward bias, while the likelihood that

34. It is easy to demonstrate that substituting the expected length of life, $R + H = pA_0 + (1 - p)A_1$ into the equation for the dashed upward-sloping line linking the points $(A_0, 0)$ and $(A_1, SSW[A_1])$ yields a level of SSW equal to SSW^u. Thus, a graphic comparison shows that, with a linear SSW schedule, a positive probability of early death means that expected SSW is greater than the SSW at the expected lifetime. That is, the latter is a downwardly biased estimate of expected SSW. Of course, if the marginal social security wealth is diminishing with the length of the retirement, it is still possible that SSW at the expected lifetime is upwardly biased.

35. Let b be the initial discounted value of the social security benefit for all periods after retirement and b^* be the benefit after reform. For a retirement with a certain length of H, the relative change in SSW is equal to the relative change in the benefit, $(b^* - b)/b$. For an uncertain retirement of length H, and with a positive probability of dying at the preretirement age A_0 some geometry reveals that the relative change in expected SSW wealth is

$$\frac{(b^* - b)\left[\dfrac{(A_1 - R)(R + H - A_0)}{A_1 - A_0}\right]}{b\left[\dfrac{(A_1 - R)(R + H - A_0)}{A_1 - A_0}\right]} = \frac{b^* - b}{b}.$$

Thus, even though making the lifetime uncertain raises the social security wealth for a given benefit level and expected life span, the relative change in wealth that results from a change in the benefit level is, under our special assumptions, the same in each case.

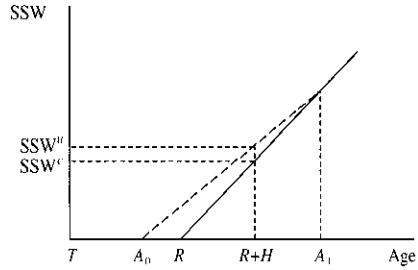


Fig. 7A.1 Expected SSW when there is a chance the worker will not survive until retirement

the real benefit growth rate is less than the discount rate (which is assumed to be 3 percent for the calculations in the paper) leads to an upward bias. Finally, if the benefit growth rate and the discount rate are reasonably close, there is reason to hope that biases in the percentage-*change* calculations that are the focus of the paper are less serious.

References

Berndt, Ernst. 1991. *The practice of econometrics: Classic and contemporary.* Reading, Mass.: Addison-Wesley.

Bosworth, Barry, and Gary Burtless, eds. 1998a. *Aging societies: The global dimension.* Washington, D.C.: Brookings.

———. 1998b. Population aging and economic performance. In *Aging societies: The global dimension,* ed. Barry Bosworth and Gary Burtless. Washington, D.C.: Brookings.

Disney, Richard. 1996. *Can we afford to grow older?* Cambridge, Mass.: MIT Press.

Feldstein, Martin. 1974. Social security, induced retirement, and aggregate capital accumulation. *Journal of Political Economy* 82 (September/October): 905–26.

———. 1996. The missing piece in policy analysis: Social security reform. *American Economic Review* 86, no. 2 (May): 1–14.

Feldstein, Martin, and Elena Ranguelova. 1998. Individual risk and intergenerational risk sharing in an investment-based social security system. Harvard University. Mimeo.

Feldstein, Martin, and Andrew Samwick. 1998. The transition path in privatizing social security. In *Privatizing social security,* ed. Martin Feldstein. Chicago: University of Chicago Press.

Franco, Daniele, and Teresa Munzi. 1996. Public pension expenditure prospects in the European Union: A survey of national projections. *European Economy,* no. 3:1–126.

Geanakoplos, John, Olivia S. Mitchell, and Stephen P. Zeldes. 1998. Social security money's worth. NBER Working Paper no. 6722. Cambridge, Mass.: National Bureau of Economic Research.

Gruber, Jonathan, and David A. Wise. 1998. Introduction and summary. In *Social*

security and retirement around the world, ed. Jonathan Gruber and David A. Wise. Chicago: University of Chicago Press.
Hamann, A. Javier. 1997. The reform of the pension system in Italy. Working Paper no. 97/18. Washington, D.C.: IMF.
IMF. Various issues. *International financial statistics.* Washington, D.C.
Kalisch, David, and Tetsuya Aman. 1997. Retirement income systems: The reform process across OECD countries. Paper delivered at the ILO-OECD Workshop on Pension Reform, Paris, December.
Kornai, Janos, and John McHale. 2000. Is post-Communist health spending unusual? A comparison with established market economies. *Economics of Transition,* forthcoming.
Kotlikoff, Laurence. 1992. *Generational accounting: Knowing who pays, and when, for what we spend.* New York: Free Press.
Kotlikoff, Laurence, and Jeffery Sachs. 1997. It's high time to privatize social security. *Brookings Review* 15, no. 3 (summer): 16–23.
Krugman, Paul. 1993. *Currencies and Crises.* Cambridge, Mass.: MIT Press.
Leibfritz, Willi, Deborah Roseveare, Douglas Fore, and Echard Wurzel. 1995. Aging populations, pension systems, and government budgets: How do they affect saving? Working Paper no. 156. Paris: Economics Department, OECD.
Mincer, Jacob. 1974. *Schooling, experience, and earnings.* New York: Columbia University Press.
OECD. 1988. *Reforming public pensions.* Paris.
———. 1997. *Ageing in OECD countries: A critical policy challenge.* Paris.
———. 1998a. *Economic outlook 64.* Paris, December.
———. 1998b. *OECD health data 98: A comparative analysis of 29 countries.* Paris. CD-ROM.
———. Various editions. *The tax/benefit position of production workers.* Paris.
Reno, Virgina P., and Robert B. Friedland. 1997. Strong support but low confidence. In *Social security in the 21st century,* ed. Eric R. Kingston and James H. Schulz. Oxford: Oxford University Press.
Roseveare, Deborah, Willi Leibfritz, Douglas Fore, and Echard Wurzel. 1996. Ageing populations, pension systems, and government budgets simulations for 20 OECD countries. Working Paper no. 168. Paris: Economics Department, OECD.
Social Security Administration (SSA). Various editions. *Social security programs throughout the world.* Washington, D.C.: Office of International Policy, SSA.
Takayama, Noriyuki. 1996. Possible effects of ageing on the equilibrium of the public pension system in Japan. *European Economy,* no. 3:155–99.
United Nations. 1996. *Demographic yearbook, 1996.* New York.
World Bank. 1995. *World tables.* Washington, D.C.

Comment David A. Wise

A great deal of attention has been directed to the risk that individuals would face if personal accounts were made part of the social security sys-

David A. Wise is the John F. Stambaugh Professor of Political Economy at the John F. Kennedy School of Government, Harvard University, and director of the Health and Retirement Programs at the National Bureau of Economic Research.

tem. In contrast, little attention has been given to the individual risk associated with government social security programs, perhaps encouraging the presumption that benefits promised under these programs are riskless guarantees. Even reform proposals that purport to assure the future financial solvency of the U.S. social security system by some combination of benefit cuts and tax increases, in part at least to avoid the assumed risk of personal accounts, fail to recognize the demonstration of risk of benefit cuts. The "maintain-benefits" proposal—one of three proposals put forth by the 1994–95 Social Security Advisory Commission—is a good example. The proposal in fact entails substantial cuts in the benefits of future retirees. The important contribution of this paper is to make clear that promised social security benefits are in fact risky "assets."

The calculations showing that recent reform proposals in several countries will substantially reduce the benefits of future retirees in these countries constitute the core of this paper. The benefit reductions are measured by the implied reductions in the present discounted value of social security wealth (SSW). McHale also presents data showing that, while demographic trends are placing increasing pressure on the future financial viability of these social security systems, they have not yet significantly reduced the benefits of current retirees. Finally, McHale gives some thought to why current workers are "willing" to accept large reductions in their future benefits while not insisting on cuts in the benefits of those now in retirement. The evidence makes it clear that benefit reductions for future retirees can be very substantial and thus that substantial risk attaches to benefit "promises." I believe, however, that, while the evidence clearly demonstrates risk, the true risk is substantially greater than the data alone demonstrate, and I believe that McHale would agree with this assessment.

Let me begin by explaining why I believe this to be the case. I assume that *risk* in this case means that realized future benefits may deviate from benefits promised today. If today's promise were guaranteed into the distant future, there would be no risk in the sense of reneging on the promise. Why might the promise be revised? To think about this risk, I find it useful to distinguish between the underlying factors that induce change in the promise, from the magnitude of the change if a change is made. It is this latter change that McHale documents.

Many factors may induce a need to revise the promise. I emphasize a few. One is the error in forecasting future death rates. Many prominent demographers believe that the U.S. Social Security Administration has consistently underestimated the continuing decline in death rates and thus the increase in life expectancy. Realized life expectancy of successive cohorts has consistently been greater than projections. Such errors are one reason for the repeated optimistic assessment of the number of years until the social security trust fund would go broke. In 1983, the projected go-broke year was 2063; the go-broke date was more or less continuously

brought nearer, and, by 1997, it had been brought to 2029. Projections of life expectancy are likely to be inaccurate in the future as well. One prominent demographer has told me that his guess is that a baby girl born in the United States today has a life expectancy of one hundred. Whatever the truth may be, there is much uncertainty about it, even among careful analysts of demographic change. Ronald Lee and Shripad Tuljapurkar (1998) have begun to assess the risk associated with demographic uncertainty (fertility and mortality) as well as productivity growth and interest rates. On the basis of their stochastic forecast analysis, they judge that the trust fund could go broke much sooner, or substantially later, than the Social Security Administration projects in either of its three scenarios. Their 95 percent confidence interval includes fund exhaustion in 2014 as well as 2037.

A second factor is incentive effects (or behavioral response). While economists make a living on incentive effects, they are often ignored or unrecognized by many participants in the political decision-making process. In particular, the provisions of the social security systems in many countries place enormous implicit taxes on work after certain ages. Such provisions seem to have been associated with striking declines in the labor force participation of older workers in several of the countries in McHale's analysis. The decline as well as the striking relation between plan provisions and the proportion of older workers in the labor force is documented by Gruber and Wise (1999). Retirement at younger and younger ages exacerbates the financial pressure on social security systems caused by demographic trends.

A third factor is calculation "error." For example, errors in the formula that was to index benefits to inflation in the 1972 U.S. social security legislation (perhaps actually realized before the legislation was implemented) caused enormous "unintended" increases in benefits over a seven-year period before they were corrected. This of course has important implications for the future financial viability of the system. Errors that inflate benefits in one year are likely to mean a reduction in benefits in future years. (As with financial market risk, there is upside as well as downside risk. Those who benefited from the error were lucky; those who later have to pay for it are unlucky.)

A fourth factor is inaction once financial imbalance is recognized. Inaction is likely to increase required adjustments. For example, without individual accounts, social security reform proposals in the United States typically entail benefit reductions of perhaps 25–35 percent if the issue is addressed now. If nothing is done for many years, as some would prefer, the required adjustment would likely be much greater. Indeed, the financial imbalance is much greater in Germany, for example, than in the United States, partly because population aging occurred earlier in Germany than in the United States and no action was taken for some time.

Now, the adjustments needed to balance the system are much greater than those that have been adopted to date (and analyzed by McHale).

McHale has very clearly demonstrated that changes that are made can imply large benefit reductions. I have tried to emphasize that the true risk is likely to be much greater than the reductions in benefits that he calculates. McHale of course recognizes this in saying that further reductions are likely to be in store in many of the countries he analyzes.

Looking at the data in a way somewhat different from the data presented in the McHale paper seems to me to reinforce this judgment. McHale presents data on the "benefit rate" defined by the average benefit per person sixty-five and older relative to GDP per person fifteen to sixty-four. More standard replacement rates—defined by the benefit as a percentage of final earnings—are shown in table 7C.1, together with additional data on plan characteristics (see Gruber and Wise 1999). Countries analyzed by McHale are noted. For a person with median lifetime earnings, the replacement rates at the *early* retirement age range from a high of 91 percent in France and the Netherlands to a low of 20 percent in Canada. The U.S. replacement rate is 41 percent. The replacement rates shown in the table are based on simulations using precise plan provisions in each country prior to proposed reforms. In some cases, these replacement rates differ substantially from those reported by McHale in his table 7.5, and I return to possible reasons for that below. I present the replacement rates here to suggest that to bring the plans in many countries into financial balance would require benefit reductions much greater than those reflected in proposed plan changes reported and analyzed by McHale in tables 7.5–7.8.

To bring the U.S. system into "balance" as indicated by non-individual account reform proposals would require benefit reductions of perhaps 25–35 percent. The U.S. change analyzed by McHale suggests a SSW reduction of about 25 percent for men and 16 percent for women. Surely, the reductions required to bring the German, French, and Italian plans, for example, into financial balance are much greater than the SSW reductions reported in McHale's table 7.7, which are implied by the proposed changes.

Finally, without disparaging the effort and important calculations made by McHale, let me mention several reasons why these calculations may represent only a first step in this kind of analysis, as McHale emphasizes. First, the calculations are based on a "stylized" benefit formula (based on an OECD approach), which may measure the effect of current and proposed plans with substantial error. The difference in the replacement rates reported in table 7C.1 (and based on actual detailed plan provisions) and the rates reported in McHale's table 7.5 may indicate the magnitude of potential differences. Second, McHale's calculations reflect in large part proposed changes in plan normal retirement ages, although he does give

Table 7C.1 **Labor Force Participation and Key Plan Features, by Country**

Country	Men Not Working Age 55–65 (%)	Men out of Labor Force Age 59 (%)	Early Retirement (ER) Age	Replacement Rate at ER Age (%)	Implicit Tax on Earnings in Next Year (%)	"Tax Force" to Retire, ER Age to 69
Belgium	67	58	"60"	77	82	8.87
France[a]	60	53	60	91	80	7.25
Italy[a]	59	53	"55"	75	81	9.20
Netherlands	58	47	"60"	91	141	8.32
United Kingdom[a]	55	38	60	48	75	3.77
Germany[a]	48	34	60	62	35	3.45
Spain	47	36	60	63	−23	2.49
Canada[a]	45	37	60	20	8	2.37
United States[a]	37	26	62	41	−1	1.57
Sweden	35	26	60	54	28	2.18
Japan[a]	22	13	60	54	47	1.65

Source: Gruber and Wise (1999).

Note: The second to last column in the table measures the implicit tax on earnings if a person works for an additional year following the early retirement age. The last column shows the sum of implicit tax rate from the early retirement age through age 69. Both measures are explained in Gruber and Wise (1999). In some countries, the effective early retirement age is ambiguous. The quotation marks are intended to signal cases where the ambiguity is perhaps the greatest, but the availability of unemployment and disability benefits creates ambiguities in other cases as well. The calculations presented in this table are taken from the individual country papers and pertain to these cases:

Belgium: The social security early retirement age is 60, but employees who are laid off are eligible for large benefits at younger ages. Thus, the accrual, implicit tax, and tax-force measures treat unemployment benefits as early retirement benefits available at 55.

France: Counting social security benefits, available at age 60, but not accounting for guaranteed income benefits for those losing their jobs at age 57 or older.

Italy: Social security benefits for private-sector employees, not counting disability availability.

Netherlands: In addition to public social security benefits, the calculations account for virtually universal employer private pension benefits. The employer plan is assumed to provide for early retirement at age 60. There is no social security early retirement in the Netherlands, but employer early retirement benefits are commonly available at age 60.

United Kingdom: Based on social security benefits only, but counting "incapacity" benefits at 60 as early retirement benefits.

Germany: Counting social security benefits and assuming a person is eligible for "early" disability benefits.

Spain: Based on RGSS (the main social security program).

[a] Countries analyzed by McHale.

some consideration to early retirement. In European countries especially, and even in the United States, only a small fraction of persons work until the normal retirement age, as shown in Gruber and Wise (1999). Much more important in reducing plan costs would be increases in the early retirement age. Third, in many European countries, disability and unem-

ployment insurance programs essentially serve as early retirement programs, which in many cases provide early retirement several years before the nominal social security early retirement age. The provisions of these programs would also have to be changed to bring the overall elderly support programs into balance.

In short, McHale has demonstrated that plan changes can have a large effect on previously "promised" social security benefits. I commend the effort to make such calculations. I believe that the true risk inherent in these programs is in fact much greater than that indicated by the calculation made in the paper.

References

Gruber, Jonathan, and David A. Wise. 1999. Introduction and summary. In *Social security and retirement around the world,* ed. Jonathan Gruber and David Wise. Chicago: University of Chicago Press.

Lee, Ronald, and Shripad Taljapurkar. 1998. Stochastic forecasts for social security. In *Frontiers in the economics of aging,* ed. David A. Wise. Chicago: University of Chicago Press.

Discussion Summary

David Wilcox noted the importance of understanding the reasons for the deterioration of the solvency projections since 1983. Changes in demographic assumptions have actually mirrored the balance and thus are not part of the reason for this evolution. Better explanations implicate initial productivity forecasts that were too optimistic and changes in the methodology used by the actuary, which tended to deteriorate the solvency projections on average. A third reason is that the projections cover only a finite (seventy-five-year) period. Given that the system is projected to be experiencing deep cash-flow deficits in the long term, the incorporation of a new seventy-fifth year into the projection period each year worsens the balance by about 0.08 percent of taxable payroll.

Andrew Samwick stated that he liked the paper very much and wondered what the size of benefit changes has been even outside the current context, that is, throughout the history of the social security system. In particular, he referred to the increases in benefits that occurred during the 1970s in both the United States and the United Kingdom. Incorporating this into the analysis might weaken some of the results in terms of how much current retirees or agents close to retirement are hurt by the more recent downward adjustments of the benefit entitlements.

Zvi Bodie noted that, in order to draw welfare implications from this

analysis, one should focus, not on the number of elderly as a fraction of the working-age population, but rather on the number of elderly in need as a fraction of the total population. Bodie expressed the opinion that many elderly choose not to retire as long as they are healthy. Therefore, the proportion of elderly per se is not a relevant concept for public policy issues. Instead, what warrants the attention of policymakers is the fact that one cares about the elderly who are needy and incapable of earning income. The dependency ratios typically analyzed do not reflect this. Bodie concluded that, in his opinion, the crisis was overstated because what underlies the decrease in mortality rates is the fact that the elderly are healthier and are therefore able to work longer.

John Shoven remarked with respect to this comment that numerous lobbies actively seek to lower, not raise, the retirement age.

Henning Bohn liked the paper generally but expressed concern about the measure of government spending used in the empirical part of the paper. First, he noted that the real challenge facing us is medical spending, not cash benefits. If one limits attention to social security cash benefits, then the perspective is definitely too narrow. Second, government cash spending seems to include spending on government-employee pensions. Bohn remarked that this potentially biases the cross-country analysis as countries differ substantially in the size of their public sector. The numbers for cash spending in countries with a large public workforce are therefore inflated artificially, independent of the social burden of the elderly that the country has to support.

James Poterba remarked that the generosity of benefit rules tends to revert to the mean over time, thereby dampening its volatility over longer horizons. In particular, he noted that, in many countries, benefits increased in the 1970s and 1980s (especially when including the programs that David Wise, the discussant, identified as important, e.g., disability), whereas, more recently, some trimming of the sails was seen in the form of benefit reductions. Someone who entered the labor force in 1970 received an unexpected windfall in benefits entitlements in the 1980s and subsequently witnessed reductions in expected benefits in the 1990s. Thus, the risk over a long period could be less than the risk over a shorter horizon.

Martin Feldstein made the following comments. Concerning David Wilcox's question about the reasons for the deterioration over the course of the 1980s and 1990s of the solvency projections, he added that early retirement was a likely cause. He agreed furthermore with Bohn's remark about the importance of Medicare, especially for the future, not so much for the current situation. Finally, he expressed the view that Bodie's opinion on the preference for late rather than early retirement was based on introspection and is most likely not representative of the entire population.

Richard Zeckhauser wondered about the timing of the incentive effects in the context of the diagrams shown by the discussant, David Wise, illustrating the dramatic decline in labor force participation by medium-old people. He asked whether it was not the case that the incentive effects were created before the changes in the generosity of pension benefits. With respect to the dangers of introspection in the context of the preference for early or late retirement, as noted by Feldstein, he referred to popular rhetoric in Europe. The rhetoric claims that the elderly should retire early in order to allow the young to find a job, given the high rates of unemployment.

Zeckhauser furthermore suggested that McHale consider alternative political economy explanations for why the young are willing to accept benefit reforms that are not favorable to them. A first alternative theory, most relevant to the United States, stresses the fact that the elderly are politically much better organized than the young, simply by virtue of being one-issue voters. A second explanation revolves around the (relatively short) horizon of the political decision-making process. Finally, Zeckhauser pointed out that social security closely resembles a contingent claim, where the benefits received are dependent on a particular contingency. This description is more appropriate than the term *risky* social security.

The discussant, *David Wise,* disagreed with Zeckhauser's first comment. Cross-country evidence convincingly shows a tight relation between implicit taxes on working and the proportion of people working between the ages of fifty-five and sixty-five. The incentive effects seem to be quite strong and very relevant for early retirement and the drop in labor force participation.

David Cutler noted that the analysis ignores survivors' benefits. They are nevertheless important.

John McHale agreed with Wilcox's criticism of the use of point distributions and stated that the direction of the bias would be examined. He also noted that the suggestions of Samwick and Poterba to analyze earlier periods of benefit increases would be enlightening. Finally, he remarked that some social security reforms move in the direction mentioned by Zeckhauser. Indeed, both Italy and Germany seem to be evolving toward a system with more explicit contingency-based benefits.