

**LEVEL OF OASDI TRUST FUND ASSETS  
NEEDED TO COMPENSATE  
FOR ADVERSE CONTINGENCIES**

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**ABSTRACT**

The Old-Age, Survivors, and Disability Insurance (OASDI) program has generally operated on a "current-cost" or "pay-as-you-go" financing basis. Under this approach, the tax collections for a given year are intended to approximately equal program expenditures for that year, plus a small residual to maintain trust fund assets at a level sufficient to cover, temporarily, any shortfalls caused by adverse program experience.

Although the financing of the program is now on a "partial advance funded" basis, there remains considerable interest in the appropriate minimum level of assets needed to serve as a contingency reserve. This study is intended to help answer this question by analyzing the reduction in assets that would occur if there were a repeat of various past adverse economic conditions.

The analysis indicates that an asset level of 50 to 105 percent of annual OASDI expenditures generally would be sufficient to cover the effects of adverse economic conditions for about 5 to 10 years. Adding another 10 to 25 percent, for the possibility of simultaneous, noneconomic adverse experience, suggests that a fund ratio of 60 to 130 percent would guard against short-range adverse contingencies. A level of 100 percent, at roughly the midpoint of this range, would represent a reasonable "target" ratio for contingency purposes.

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**INTRODUCTION**

In contrast to private pension plans, the funding goal for the OASDI program has never been to accumulate large reserves equal to accrued liabilities. Rather, the goal has alternated between operating on a "current-cost" basis (often referred to as "pay-as-you-go" financing) or on a "partial advance funding" basis [9]. With current-cost financing, the tax income collected each year is intended to be just sufficient to meet current expenditures and to maintain a relatively small level of trust fund

assets as a temporary reserve against adverse contingencies. Under partial advance funding, tax income initially would exceed expenditures somewhat, leading to an accumulation of trust fund assets beyond that required just for contingencies. This accumulation would represent a much lower level of reserves than generally associated with full advance funding, however; where full funding would eventually result in assets totaling about 20 to 25 times annual expenditures [4, 11], partial advance funding is generally associated with asset levels about 2 to 5 times annual expenditures. Over much of the OASDI program's history, the actual year-by-year financing has approximated a current-cost basis. More recently, however, tax income has exceeded current expenditures (by about 12 percent during 1986-90), leading to a degree of advance funding.

Considerable interest has been expressed over the years in the level of trust fund assets required—under current-cost financing—to serve as a contingency reserve against temporary adverse economic or other conditions. This interest has revived recently because the trust funds, as a consequence of the Social Security Amendments of 1983, have once again begun to approach the asset levels normally associated with current-cost financing. Consideration of proposals to return to current-cost financing, such as S.11 introduced in the 102nd Congress by Senator Daniel Patrick Moynihan (D-N.Y.), have added to the discussion.

The purpose of this investigation is to determine a range of trust fund levels consistent with the goals of current-cost financing and to specify clearly the basis for this range. In addition, a specific "target" level of trust fund assets will be recommended. Suggestions for further research in this area also will be provided.

In discussing this topic we should keep in mind the nature of trust fund assets and what it means to "redeem trust fund investments" to cover operating deficits. Specifically, the assets are invested in special debt obligations of the U.S. Treasury. These securities may be redeemed at any time for their full face value, if needed to meet program expenditures. As such, the invested assets represent federal budget authority held in reserve. If program expenditures exceed current income, the existence of trust fund assets automatically authorizes the transfer of funds from the general fund of the Treasury to meet expenditures, without the need for specific appropriation legislation (as would be required in the case of non-trust-fund programs). The trust funds thus provide a convenient accounting mechanism for handling day-to-day cash transactions and avoiding the need to adjust payroll tax rates too frequently. The legal

ability to continue OASDI benefit payments when cash income is insufficient comes from the reserve budget authority. The actual cash comes from federal revenue sources such as personal and corporate income taxes and borrowing from the public.<sup>1</sup> At the beginning of 1993, the OASI Trust Fund held assets totaling approximately \$320 billion (about 117 percent of estimated OASI expenditures for 1993) and DI Trust Fund assets amounted to about \$12 billion (34 percent of DI expenditures).

### PREVIOUS STUDIES

Relatively few studies of this type have been undertaken. Van de Water and Thompson [12] concluded in 1976 that trust fund assets equivalent to 60 percent of annual expenditures would be adequate to withstand most economic recessions without tax increases until unemployment fell below 6 percent.

Bartlett and Applebaum [1] modeled the effects on the OASDI program of past differences between assumed economic conditions and actual experience. They estimated that if the forecasting errors from past trustees reports were repeated, the OASDI fund ratio would decline by about 9 to 42 percentage points over 5 years (depending on which of the reports for 1970 to 1976 was used to define the forecasting errors).

In 1984, Munnell and Blais [8] calculated that a range of 85 to 145 percent of annual expenditures would be sufficient for contingency purposes under conditions ranging from a severe recession to back-to-back recessions.

Myers [10] estimated in 1990 that had a fund ratio of 100 percent of annual expenditures been on hand at the beginning of 1977, it would have been sufficient to withstand the adverse economic conditions experienced during 1977–1982. Specifically, he demonstrated that the fund ratio would have declined by approximately 55 percentage points over 6 years, reaching 45 percent at the beginning of 1983.

The first three of these four studies were based on the differences between a baseline trust fund projection and one or more alternative scenarios portraying less favorable economic experience. The alternative scenarios were fairly comparable among the studies, since they were largely based on the actual economic experience during some or all of the 1970s.

<sup>1</sup>For additional information on the role and purpose of the trust funds, see reference [7].

The baselines also were fairly comparable and were similar to the intermediate economic assumptions used in the trustees reports of the mid-1970s. Because these assumptions were fairly optimistic (by today's standards), the differences between the baseline and adverse scenarios were relatively large, leading to somewhat higher asset requirements than might be expected with a less optimistic baseline projection.

### METHODOLOGY

This study is similar in concept to these earlier works. A baseline projection is developed by using the "intermediate" (alternative II-B) economic and demographic assumptions from the *1990 OASDI Trustees Report* [2]. These assumptions were chosen on the grounds that if Congress were to establish a current-cost tax rate schedule, it would normally base the schedule on the intermediate assumptions of the trustees. In addition, to contrast trust fund operations under normal conditions with those under adverse conditions, a baseline that assumed "average" economic performance had to be selected. The alternative II-B assumptions from the *1990 OASDI Trustees Report* meet this criteria, since they were prepared early in 1990 and thus did not reflect the recession that began in the third quarter of 1990. The results of the analysis would not be significantly different if a more recent set of assumptions were used (such as the intermediate assumptions from the *1993 OASDI Trustees Report*), so long as the forecast was for average economic performance.

To construct a baseline projection under the current-cost financing hypothesis (as opposed to the partial advance funding basis of present law), the tax rates were modified as necessary to produce a constant asset level equal to 100 percent of each year's expenditures.<sup>2</sup> The wage, price, and unemployment assumptions under the alternative II-B assumptions of the

<sup>2</sup>It would be tempting, for convenience, to compare baseline and alternative projection scenarios using the financing schedule specified in present law. This would be inappropriate, however, because the decline in assets due to a given set of adverse conditions depends on the level of financing. Thus, the answers obtained on the basis of the partial advance funding incorporated in present law would not be the same as those under a current-cost financing schedule. For example, under present-law financing, the decline in the OASDI fund ratio shown in the *1990 Trustees Report* between the intermediate alternative II-B assumptions and the pessimistic alternative III assumptions was 120 percent over 10 years. With current-cost financing, the decline would be 101 percent. For this study, a baseline trust fund level of 100 percent of annual expenditures was chosen arbitrarily as a starting point, with the expectation that an iterative process might be necessary to determine the final target level for current-cost financing. As it happened, the "traditional" level of 100 percent proved to be about right and no further iterations were necessary.

*1990 Trustees Report* are summarized in Table 1. The operations of the OASDI Trust Funds for the baseline projection were calculated by using the full trust fund projection model developed by the Office of the Actuary, Social Security Administration.

TABLE 1  
PRIMARY ECONOMIC ASSUMPTIONS UNDER ALTERNATIVE II-B, 1990 OASDI TRUSTEES REPORT

Assumption	Calendar Year										
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Nominal Wage Increase	6.3%	5.6%	5.5%	5.5%	5.4%	5.5%	5.4%	5.4%	5.5%	5.4%	5.4%
Benefit Increase	4.7	4.5	4.5	4.4	4.3	4.2	4.0	4.0	4.0	4.0	4.0
Unemployment Rate	5.3	5.5	5.6	5.6	5.6	5.7	5.7	5.7	5.8	5.8	5.8

Note that the same process could be performed for OASI and DI separately and might well lead to somewhat different fund ratio targets for the two programs. Given the history of tax rate reallocations between the two trust funds, it is not unreasonable to consider the combined assets only.

Against the baseline described above, we compared a number of pessimistic economic scenarios comprising alternative average wage increases, cost-of-living benefit increases, and unemployment rates. An approximation model was used for this purpose, in lieu of the full trust fund projection model. The approximation model estimates the various OASDI income and expenditure amounts for an alternative scenario by applying simple ratios of alternative-to-baseline economic factors to the corresponding baseline amounts. For example, the tax income in year  $1990+j$ , reflecting different wage increases  $\{w_{1990+i}\}$  in 1990 through  $1990+j$  would be estimated as:

$$Taxes_{1990+j}^{alt} = Taxes_{1990+j}^{base} \left[ \prod_{i=0}^j \left( \frac{1 + w_{1990+i}^{alt}}{1 + w_{1990+i}^{base}} \right) \right]$$

Various adjustments are required to reflect lags in tax collections, the "impermanence" of cost-of-living benefit increases, secondary economic effects of unemployment changes (Okun's Law), changes in administrative expenses, the effect on interest earnings, the net effect on transfers under the Railroad Retirement financial interchange, and any reductions

in benefit increases that might result under the Section 215(i) "stabilizer" provision of the Social Security Act, among other factors. This approximation model produces results that are generally within a few percentage points of the full model.

Note that variations in only the three primary economic factors (wage increases, benefit increases, and unemployment rates) are reflected in this model. Changes in interest rates, labor force participation, and other economic parameters are not considered. Of the omitted variables, the interest rate is potentially the most sensitive; however, in the context of contingency asset levels under pay-as-you-go financing, the effect of not varying interest rates is relatively small.

### SELECTION OF ALTERNATIVE SCENARIOS

In establishing the adverse scenarios, alternative wage increases were allowed to begin with 1989, because the actual value for 1989 was not known with certainty at the time of the *1990 Trustees Report*. Benefit increases and unemployment rates were varied beginning with 1990.

The first set of pessimistic scenarios was based on actual past economic experience. Starting with the alternative II-B baseline for 1989–99, one or more years of past economic experience were substituted for the baseline assumptions. For example, one scenario replaces the II-B assumptions for 1990–94 with the actual wage increases, benefit increases, and unemployment rates from 1973–77<sup>3</sup> and retains the original baseline assumptions for 1995–99.

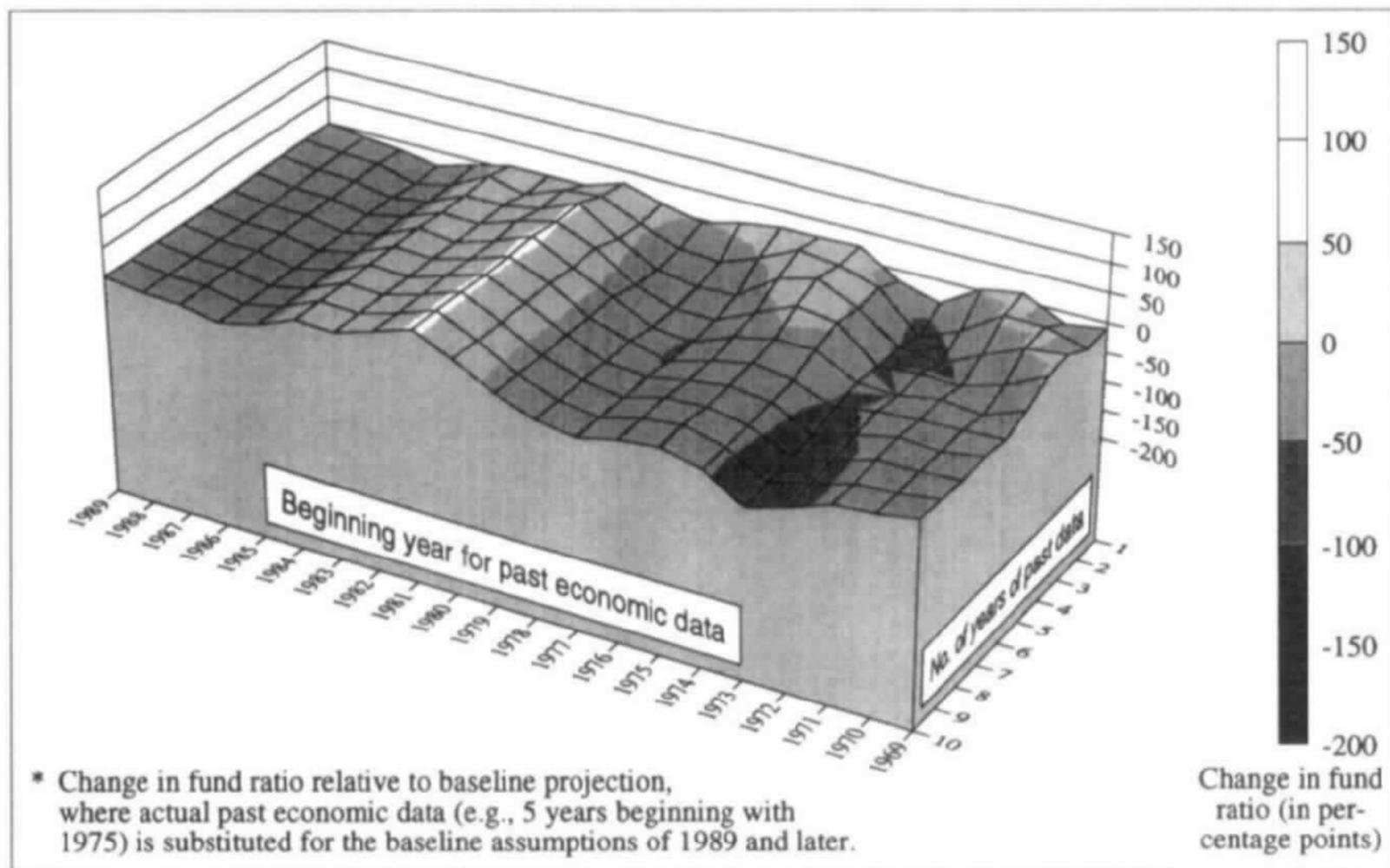
To help identify past periods with the most adverse effect on the trust funds, we performed a simpler approximation<sup>4</sup> under all possible combinations of  $N$  years of past experience ( $N=1, 2, \dots, 10$ ) beginning with year  $Y$  ( $Y=1969, 1970, \dots, 1989$ ). Figure 1 provides a graphical summary of the changes in trust fund ratios at the end of 10 years under the various combinations.

Relatively few of the scenarios resulted in declines of more than 50 percentage points in the trust fund ratio after 10 years. This somewhat

<sup>3</sup>For this purpose, the past benefit increases were calculated as if the current definition (based on the third-quarter to third-quarter increase in the CPI-W) had been in place throughout this period.

<sup>4</sup>For this purpose, we used the approximation developed by Bartlett and Applebaum [1]. It is computationally convenient but somewhat less accurate than the more elaborate approximation model. In particular, because of the Social Security Amendments of 1977, this method tends to overstate the effect of cost-of-living benefit increases.

FIGURE 1  
 APPROXIMATE CHANGE IN OASDI FUND RATIO AFTER 10 YEARS  
 IF PAST ECONOMIC CONDITIONS ARE RE-EXPERIENCED\*  
 BEGINNING WITH 1989 WAGE INCREASE AND BASED ON UNADJUSTED HISTORICAL DATA



unexpected outcome occurs as a result of the artificially abrupt transition from the current “medium” wage and price growth conditions to the rapid wage and price increases that characterized much of the historical period. In particular, benefit payments in 1990 were largely determined by the actual 4.7 percent benefit increase in December 1989. If the 1989 or 1990 wage increase under alternative II-B is replaced by the 9.8 percent increase from 1979, for example, tax income during 1990 is immediately and substantially increased. Thus, without adjustment of the past data, many of the adverse scenarios actually start off with a highly *favorable* trust fund effect.

From the universe of economic scenarios described above, several with the most unfavorable trust fund effects were selected and run through the more refined approximation model. The assumptions contained in these scenarios and the resulting changes in the OASDI fund ratio are shown in Table 2. Over 5 years, the fund ratio would decline by about

TABLE 2

SELECTED ADVERSE ECONOMIC SCENARIOS, BEGINNING WITH 1989 WAGE INCREASE, BASED ON UNADJUSTED HISTORICAL DATA

Historical Data from ...	Assumption	Calendar Year											Change in Fund Ratio after ...	
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	5 Years*	10 Years†
1972-77	Wage increase	7.3%	6.9%	7.4%	6.7%	8.7%	7.3%	5.4%	5.4%	5.5%	5.4%	5.4%	} -25%	-41%
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	5.7	5.7	5.8	5.8	5.8		
1972-82	Wage increase	7.3	6.9	7.4	6.7	8.7	7.3	9.7	9.8	9.0	9.7	6.5	} -25	-65
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	7.9	12.0	12.8	10.7	5.7		
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	6.1	5.8	7.1	7.6	9.7		
1973-78	Wage increase	6.9	7.4	6.7	8.7	7.3	9.7	5.4	5.4	5.5	5.4	5.4	} -27	-37
	Benefit increase	4.7	11.5	8.7	5.4	6.7	7.9	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	5.6	8.5	7.7	7.1	6.1	5.7	5.7	5.8	5.8	5.8		
1973-83	Wage increase	6.9	7.4	6.7	8.7	7.3	9.7	9.8	9.0	9.7	6.5	5.0	} -27	-76
	Benefit increase	4.7	11.5	8.7	5.4	6.7	7.9	12.0	12.8	10.7	5.7	2.4		
	Unemployment rate	5.3	5.6	8.5	7.7	7.1	6.1	5.8	7.1	7.6	9.7	9.6		
1977-82	Wage increase	7.3	9.7	9.8	9.0	9.7	6.5	5.4	5.4	5.5	5.4	5.4	} -24	-45
	Benefit increase	4.7	7.9	12.0	12.8	10.7	5.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	6.1	5.8	7.1	7.6	9.7	5.7	5.7	5.8	5.8	5.8		
1977-87	Wage increase	7.3	9.7	9.8	9.0	9.7	6.5	5.0	7.2	4.3	4.3	5.0	} -24	-45
	Benefit increase	4.7	7.9	12.0	12.8	10.7	5.7	2.4	3.5	3.1	1.3	4.2		
	Unemployment rate	5.3	6.1	5.8	7.1	7.6	9.7	9.6	7.5	7.2	7.0	6.2		

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

25 percentage points; over 10 years, the declines would be in the range of 37 to 76 percentage points.

To address the problem of abrupt and unrealistic transitions, described above, the first adjustment we tried was to forgo modifying the 1989 wage increase. Figure 2 shows the resulting pattern of changes in the fund ratio, for all scenarios on the rough approximation basis. A number of scenarios based on actual data starting in 1973–74 or 1977–80 led to 10-year asset declines between 50 and 100 percent of annual expenditures. The effect of a higher wage increase in 1990, however, still resulted in a “less unfavorable” scenario than might be anticipated. The assumptions and fund ratio changes for several of these scenarios are shown in Table 3. The 5-year asset declines are in the range of 28 to 42 percentage points, and the 10-year declines range from 49 to 80 percentage points.

FIGURE 2

APPROXIMATE CHANGE IN OASDI FUND RATIO AFTER 10 YEARS  
IF PAST ECONOMIC CONDITIONS ARE RE-EXPERIENCED\*  
BEGINNING WITH 1990 WAGE INCREASE AND BASED ON UNADJUSTED HISTORICAL DATA

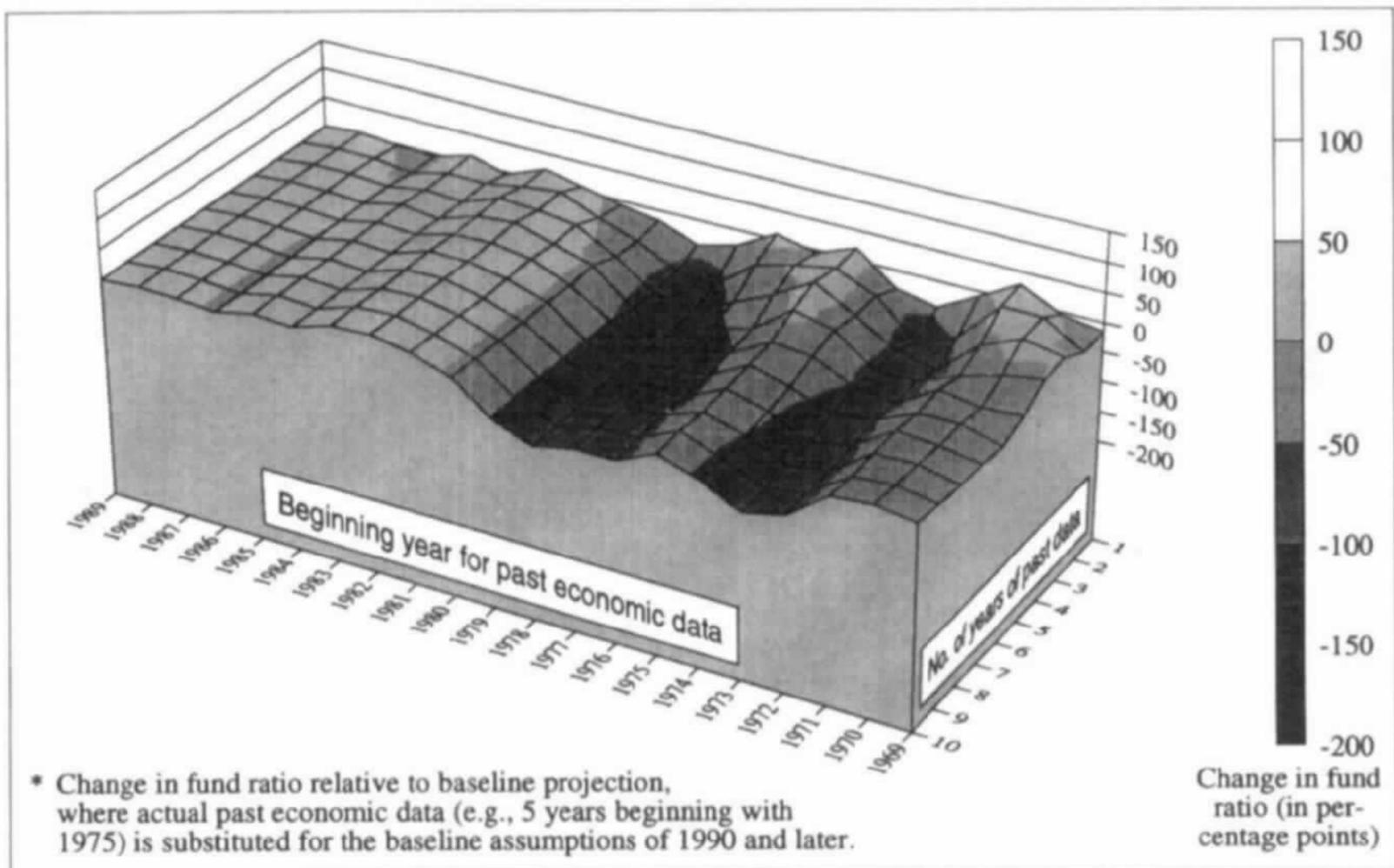


TABLE 3

## SELECTED ADVERSE ECONOMIC SCENARIOS, BEGINNING WITH 1990 WAGE INCREASE, BASED ON UNADJUSTED HISTORICAL DATA

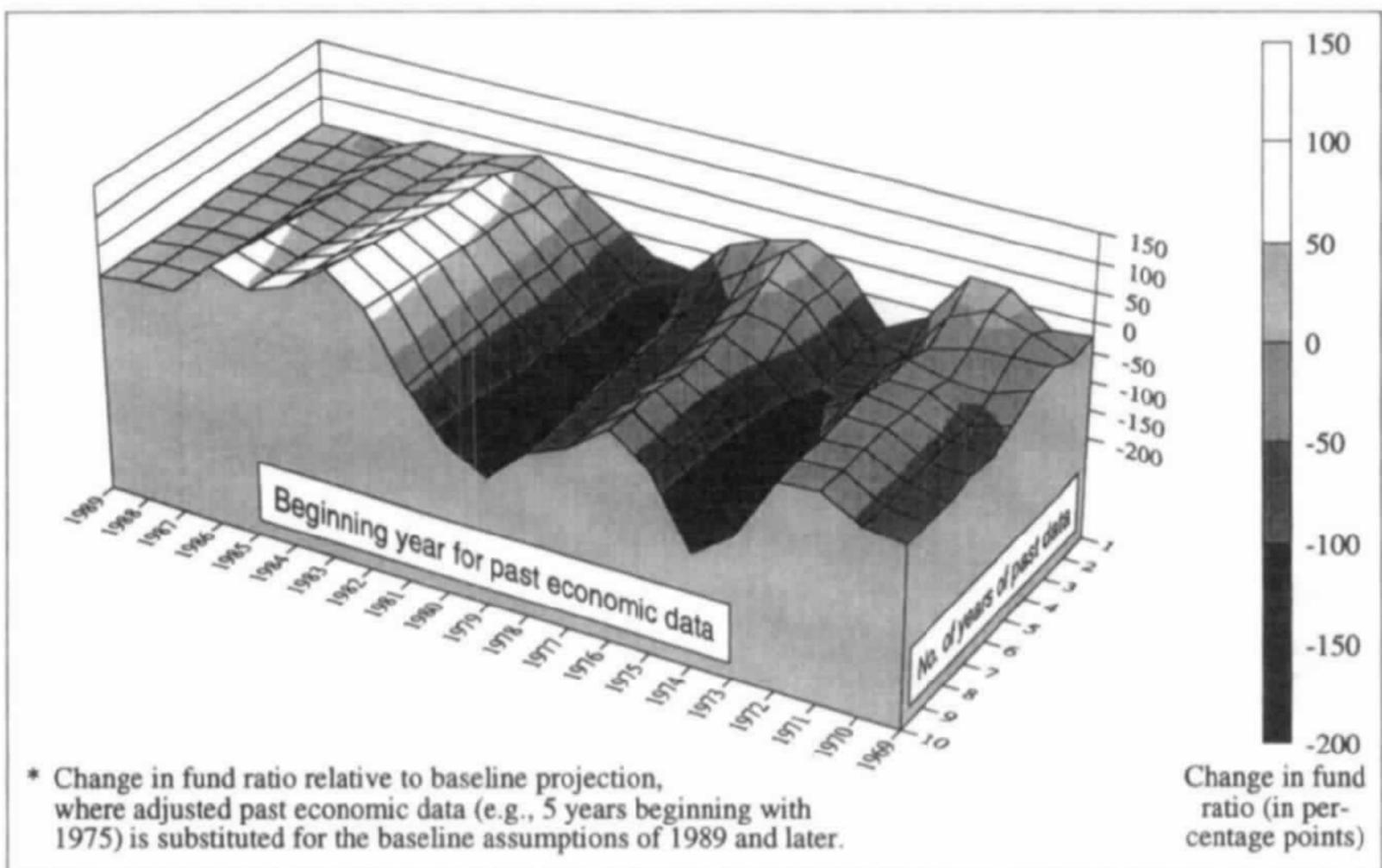
Historical Data from ...	Assumption	Calendar Year											Change in Fund Ratio after ...	
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	5 Years*	10 Years†
1973-77	Wage increase	6.3%	6.9%	7.4%	6.7%	8.7%	7.3%	5.4%	5.4%	5.5%	5.4%	5.4%	} -29%	} -49%
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	5.7	5.7	5.8	5.8	5.8		
1973-82	Wage increase	6.3	6.9	7.4	6.7	8.7	7.3	9.7	9.8	9.0	9.7	6.5	} -29	} -71
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	7.9	12.0	12.8	10.7	5.7		
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	6.1	5.8	7.1	7.6	9.7		
1974-83	Wage increase	6.3	7.4	6.7	8.7	7.3	9.7	9.8	9.0	9.7	6.5	5.0	} -30	} -80
	Benefit increase	4.7	11.5	8.7	5.4	6.7	7.9	12.0	12.8	10.7	5.7	2.4		
	Unemployment rate	5.3	5.6	8.5	7.7	7.1	6.1	5.8	7.1	7.6	9.7	9.6		
1978-82	Wage increase	6.3	9.7	9.8	9.0	9.7	6.5	5.4	5.4	5.5	5.4	5.4	} -28	} -53
	Benefit increase	4.7	7.9	12.0	12.8	10.7	5.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	6.1	5.8	7.1	7.6	9.7	5.7	5.7	5.8	5.8	5.8		
1979-83	Wage increase	6.3	9.8	9.0	9.7	6.5	5.0	5.4	5.4	5.5	5.4	5.4	} -42	} -64
	Benefit increase	4.7	12.0	12.8	10.7	5.7	2.4	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	5.8	7.1	7.6	9.7	9.6	5.7	5.7	5.8	5.8	5.8		
1979-88	Wage increase	6.3	9.8	9.0	9.7	6.5	5.0	7.2	4.3	4.3	5.0	5.1	} -42	} -60
	Benefit increase	4.7	12.0	12.8	10.7	5.7	2.4	3.5	3.1	1.3	4.2	4.0		
	Unemployment rate	5.3	5.8	7.1	7.6	9.7	9.6	7.5	7.2	7.0	6.2	5.5		

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

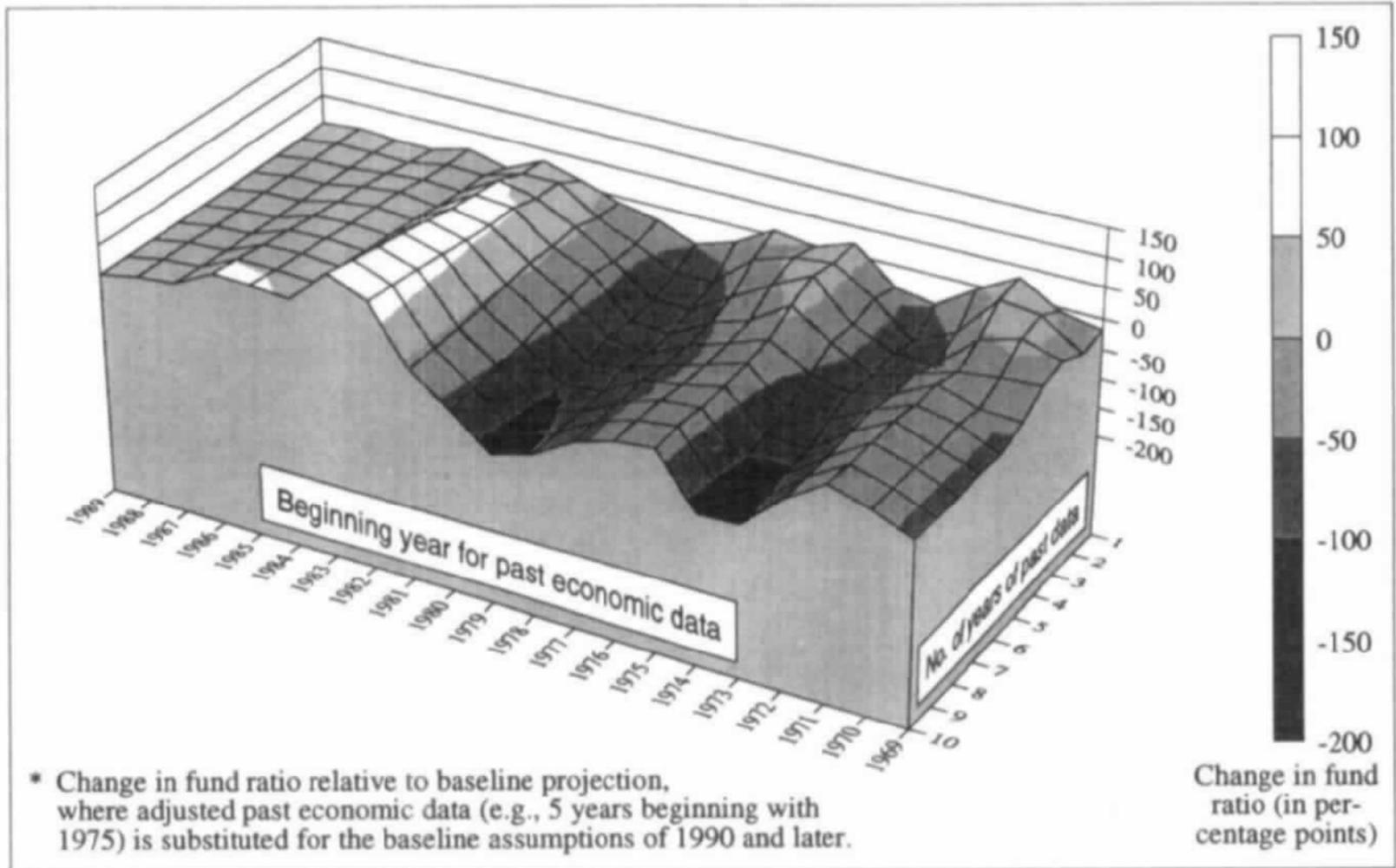
The next approach to using historical data was to adjust the past data by the *difference* between the actual values in 1989 and the values at the start of the given historical period. For this purpose, the benefit increases and unemployment rates were adjusted directly by their initial differences, but the nominal wage increases were adjusted such that the historical pattern of *real* wage increases was maintained, given the adjusted price series.<sup>5</sup> The rough results are shown in Figures 3 and 4 (corresponding to whether the wage increase for 1989 is modified).

FIGURE 3  
APPROXIMATE CHANGE IN OASDI FUND RATIO AFTER 10 YEARS  
IF PAST ECONOMIC CONDITIONS ARE RE-EXPERIENCED\*  
BEGINNING WITH 1989 WAGE INCREASE AND BASED ON ADJUSTED HISTORICAL DATA



<sup>5</sup>For example, consider substitution of the actual 1974 experience for the baseline 1990 assumption. The 11.5 percent benefit increase for 1974 (see footnote 3) would be adjusted downward by the difference in the corresponding benefit increases for 1973 (6.9 percent) and 1989 (4.7 percent). The result, 9.3 percent, would be substituted for the baseline 1990 assumption. The nominal wage increase for 1990 would equal the adjusted CPI increase of 9.3 percent plus the difference between the 1974 nominal wage and benefit increases (-4.1 percent), for a total of 5.2 percent.

FIGURE 4  
 APPROXIMATE CHANGE IN OASDI FUND RATIO AFTER 10 YEARS  
 IF PAST ECONOMIC CONDITIONS ARE RE-EXPERIENCED\*  
 BEGINNING WITH 1990 WAGE INCREASE AND BASED ON ADJUSTED HISTORICAL DATA



Not all of these scenarios are realistic; in particular, a number of the most pessimistic results arise from adjusted data with *nominal* wage increases of less than 1 percent for 2 or more years. Tables 4 and 5 present the assumptions and fund ratio changes for several of the more plausible scenarios based on this approach. The decline in the fund ratio varies from 36 to 44 percentage points over 5 years and from 53 to 111 percentage points over 10 years.

Finally, Table 6 presents the results of several scenarios based on actual historical data, but with crude smoothing adjustments to the beginning and ending transition years. These scenarios indicate declines of 42 to 44 percent over 5 years and 64 to 91 percent over 10 years.

TABLE 4

## SELECTED ADVERSE ECONOMIC SCENARIOS, BEGINNING WITH 1989 WAGE INCREASE, BASED ON ADJUSTED HISTORICAL DATA

Historical Data from ...	Assumption	Calendar Year											Change in Fund Ratio after ...	
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	5 Years*	10 Years†
1973-78	Wage increase	4.7%	5.2%	4.5%	6.5%	5.1%	7.5%	5.4%	5.4%	5.5%	5.4%	5.4%	} -44%	} -66%
	Benefit increase	4.7	9.3	6.5	3.2	4.5	5.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	6.0	8.9	8.1	7.5	6.5	5.7	5.7	5.8	5.8	5.8		
1973-83	Wage increase	4.7	5.2	4.5	6.5	5.1	7.5	7.6	6.8	7.5	4.3	2.8	} -44	} -111
	Benefit increase	4.7	9.3	6.5	3.2	4.5	5.7	9.8	10.6	8.5	3.5	0.2		
	Unemployment rate	5.3	6.0	8.9	8.1	7.5	6.5	6.2	7.5	8.0	10.1	10.0		
1978-83	Wage increase	6.5	6.6	5.8	6.5	3.3	1.8	5.4	5.4	5.5	5.4	5.4	} -41	} -70
	Benefit increase	4.7	8.8	9.6	7.5	2.5	-0.8‡	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	5.0	6.3	6.8	8.9	8.8	5.7	5.7	5.8	5.8	5.8		
1978-88	Wage increase	6.5	6.6	5.8	6.5	3.3	1.8	4.0	1.1	1.1	1.8	1.9	} -42	} -72
	Benefit increase	4.7	8.8	9.6	7.5	2.5	-0.8‡	0.3	-0.1‡	-1.9‡	1.0	0.8		
	Unemployment rate	5.3	5.0	6.3	6.8	8.9	8.8	6.7	6.4	6.2	5.4	4.7		

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

‡In practice, benefits are not reduced if the cost of living decreases. Instead, the cost-of-living adjustment is deferred until the cumulative annual change becomes positive. The figures shown here represent the increase in the CPI-W from the third quarter of the prior year to the third quarter of the year shown, after adjustment as described in the text.

TABLE 5

## SELECTED ADVERSE ECONOMIC SCENARIOS, BEGINNING WITH 1990 WAGE INCREASE, BASED ON ADJUSTED HISTORICAL DATA

Historical Data from ...	Assumption	Calendar Year											Change in Fund Ratio after ...	
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	5 Years*	10 Years†
1974-78	Wage increase	6.3%	5.2%	4.5%	6.5%	5.1%	7.5%	5.4%	5.4%	5.5%	5.4%	5.4%	} -36%	-53%
	Benefit increase	4.7	9.3	6.5	3.2	4.5	5.7	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	6.0	8.9	8.1	7.5	6.5	5.7	5.7	5.8	5.8	5.8		
1974-83	Wage increase	6.3	5.2	4.5	6.5	5.1	7.5	7.6	6.8	7.5	4.3	2.8	} -36	-99
	Benefit increase	4.7	9.3	6.5	3.2	4.5	5.7	9.8	10.6	8.5	3.5	0.2		
	Unemployment rate	5.3	6.0	8.9	8.1	7.5	6.5	6.2	7.5	8.0	10.1	10.0		
1979-83	Wage increase	6.3	6.6	5.8	6.5	3.3	1.8	5.4	5.4	5.5	5.4	5.4	} -42	-71
	Benefit increase	4.7	8.8	9.6	7.5	2.5	-0.8‡	4.0	4.0	4.0	4.0	4.0		
	Unemployment rate	5.3	5.0	6.3	6.8	8.9	8.8	5.7	5.7	5.8	5.8	5.8		
1979-88	Wage increase	6.3	6.6	5.8	6.5	3.3	1.8	4.0	1.1	1.1	1.8	1.9	} -43	-74
	Benefit increase	4.7	8.8	9.6	7.5	2.5	-0.8‡	0.3	-0.1‡	-1.9‡	1.0	0.8		
	Unemployment rate	5.3	5.0	6.3	6.8	8.9	8.8	6.7	6.4	6.2	5.4	4.7		

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

‡In practice, benefits are not reduced if the cost of living decreases. Instead, the cost-of-living adjustment is deferred until the cumulative annual change becomes positive. The figures shown here represent the increase in the CPI-W from the third quarter of the prior year to the third quarter of the year shown, after adjustment as described in the text.

TABLE 6

## SELECTED ADVERSE ECONOMIC SCENARIOS, BEGINNING WITH 1989 WAGE INCREASE, WITH TRANSITION ADJUSTMENTS ONLY

Historical Data from ...	Assumption	Calendar Year											Change in Fund Ratio after ...		
		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	5 Years*	10 Years†	
1972-77	Wage increase	5.0%	5.0%	7.4%	6.7%	8.7%	7.3%	5.4%	5.4%	5.5%	5.4%	5.4%	}	-43%	-73%
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	4.0	4.0	4.0	4.0	4.0			
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	5.7	5.7	5.8	5.8	5.8			
1972-82	Wage increase	5.0	5.0	7.4	6.7	8.7	7.3	9.7	9.8	9.0	9.7	6.5	}	-42	-91
	Benefit increase	4.7	6.9	11.5	8.7	5.4	6.7	7.9	12.0	12.8	10.7	5.7			
	Unemployment rate	5.3	4.9	5.6	8.5	7.7	7.1	6.1	5.8	7.1	7.6	9.7			
1977-82	Wage increase	5.5	7.0	9.8	9.0	9.7	6.5	5.4	5.4	5.5	5.4	5.4	}	-42	-78
	Benefit increase	4.7	7.9	12.0	12.8	10.7	5.7	4.0	4.0	4.0	4.0	4.0			
	Unemployment rate	5.3	6.1	5.8	7.1	7.6	9.7	5.7	5.7	5.8	5.8	5.8			
1977-87	Wage increase	5.5	7.0	9.8	9.0	9.7	6.5	5.0	7.2	4.3	4.3	5.0	}	-42	-78
	Benefit increase	4.7	7.9	12.0	12.8	10.7	5.7	2.4	3.5	3.1	1.3	4.2			
	Unemployment rate	5.3	6.1	5.8	7.1	7.6	9.7	9.6	7.5	7.2	7.0	6.2			
1978-83	Wage increase	6.0	7.0	9.0	9.7	6.5	5.0	5.4	5.4	5.5	5.4	5.4	}	-44	-68
	Benefit increase	4.7	9.0	12.8	10.7	5.7	2.4	4.0	4.0	4.0	4.0	4.0			
	Unemployment rate	5.3	5.8	7.1	7.6	9.7	9.6	5.7	5.7	5.8	5.8	5.8			
1978-88	Wage increase	6.0	7.0	9.0	9.7	6.5	5.0	7.2	4.3	4.3	5.0	5.1	}	-44	-64
	Benefit increase	4.7	9.0	12.8	10.7	5.7	2.4	3.5	3.1	1.3	4.2	4.0			
	Unemployment rate	5.3	5.8	7.1	7.6	9.7	9.6	7.5	7.2	7.0	6.2	5.5			

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

### OTHER CONSIDERATIONS

The scenarios described above provide a reasonable illustration of the effect of temporary, adverse economic conditions, such as recessions and/or high inflation, on trust fund assets. Another consideration is the possibility that the *trend* of actual economic experience will be permanently less favorable than assumed when financing was set. To illustrate the potential effects of such differences, three scenarios were run with a constant 0.5 percentage point variation in the annual wage increases, benefit increases, or unemployment rates, respectively, compared to the baseline alternative II-B assumptions. A fourth illustration was prepared combining all three assumption changes. The results are shown in Table 7. The fund ratio declines by about 19 percentage points over 5 years as a result of the combined trend errors; over 10 years, the corresponding figure is 53 percentage points.

TABLE 7  
ECONOMIC SCENARIOS BASED ON TREND ERROR IN ASSUMPTIONS

Scenario Based on 1990 Alternative II-B, Except ...	Change in OASDI Fund Ratio after ...	
	5 Years*	10 Years†
Wage increase reduced by 0.5 percent in each year 1989 through 1999	-9%	-27%
Benefit increase raised by 0.5 percent in each year 1990 through 1999	-6	-21
Unemployment rate raised by 0.5 percent in each year 1990 through 1999	-4	-7
All of the above	-19%	-53%

\*Change in fund ratio for 5-year period from beginning of 1990 to the beginning of 1995.

†Change in fund ratio for 10-year period from beginning of 1990 to the beginning of 2000.

A contingency reserve also might be called upon to offset the effects of other, noneconomic adverse experience. For example, disability incidence rates, AIDS incidence, retirement rates, and numerous other factors could vary from their assumed levels and result in higher expenditures or lower income. The alternative III assumptions from the trustees report include unfavorable demographic and programmatic assumptions, in addition to the adverse economic assumptions. Table 8 shows the decline in trust fund ratios that would occur under alternative III as

TABLE 8  
 APPROXIMATE DISTRIBUTION OF REDUCTION IN FUND RATIO  
 UNDER ALTERNATIVE III BY ECONOMIC VERSUS NONECONOMIC FACTORS

Source of Variation	Change in OASDI Fund Ratio at End of ...	
	5 Years	10 Years
Change attributable to differences in economic assumptions between alternatives III and II-B	-28%	-75%
Change attributable to all other factors	-10	-26
Total	-38%	-101%

compared to the baseline projection.<sup>6</sup> The approximate distribution of the effects between the economic assumptions and all other assumptions also is shown.

The effect of alternative III's wage, price, and unemployment assumptions is a reduction in the fund ratio by about 28 percentage points over 5 years and 75 percentage points over 10 years. About another 10 percentage points and 26 percentage points, respectively, are attributable to the noneconomic factors. For contingency reserve purposes, it is desirable to include the latter amounts in addition to the potential decline due to adverse economic conditions.

A final consideration is that the fund assets should not go below 8 to 9 percent of annual expenditures at the beginning of any month, or else there would not be sufficient assets to cover the benefit payments falling due on the third of the month. If assets fall below this level and are insufficient to meet expenditures, Section 201(a) of the Social Security Act provides for the advance transfer of payroll tax income for the month in question to help prevent a default. The availability of each month's tax income at the beginning of the month effectively raises trust fund assets by about 5 to 7 percent of annual expenditures, depending on the degree of inadequacy of the financing. Thus, this provision slightly reduces the level of assets that would otherwise be required to guard against adverse contingencies. Consideration also could be given to the desirability of leaving a residual asset balance of some significant level, for purposes of "public assurance." We have chosen not to include such a factor in this analysis, on the grounds that this is an attempt to determine the

<sup>6</sup>Recall that this comparison is in the context of a program financed on a current-cost basis, with a level fund ratio of 100 percent under the alternative II-B assumptions. As noted earlier, the figures shown here will not match the corresponding values shown in the *1990 Trustees Report*, which reflect the higher OASDI tax rates under present law.

assets needed for *financial contingency* purposes, not public relations or other purposes.

### CONCLUSION AND RECOMMENDATIONS

A key question concerns the period over which the trust funds should be expected to cover unanticipated shortfalls. On the one hand, there should be sufficient time for Congress to take action—preferably at a time that would not aggravate the unfavorable conditions (say, for example, by raising taxes in the middle of a recession). On the other hand, the trust funds should not be expected to take the place of adequate financing for very long. The assets, after all, represent only the authority to use other federal revenue, which, in the short run, may represent nothing more than additional federal borrowing from the public. As such, the contingency reserve is more of a convenient mechanism that enables the program to continue to operate temporarily at a time when its normal tax income is insufficient.

In my opinion, a fund adequate to cover shortfalls for 5 years is a reasonable minimum; at the upper end, adequacy for anything more than 10 years seems excessive in the context of current-cost financing (and potentially misleading). Thus, I would consider it reasonable to establish a target range of 60 to 130 percent of annual expenditures, as developed in Table 9. The approximate midpoint of this range, 100 percent, is a very reasonable specific target.

TABLE 9  
PROPOSED RANGE OF OASDI FUND RATIOS FOR CONTINGENCY RESERVE PURPOSES

Contingency	5-year Horizon	10-year Horizon	Approximate Midpoint
Adverse economic conditions*	44%	100%	—
Adverse noneconomic conditions†	10	26	—
Beginning-of-month requirement	9	9	—
Less margin provided by provision for advance tax transfers	-5	-5	—
Total (rounded)	60%	130%	100%

\*Figures shown for each time period are based on an average of the three scenarios from Tables 2-6 having the most adverse effect on the fund ratio over the corresponding time period.

†Based on the effect of the noneconomic factors from the alternative III set of assumptions, as shown in Table 8.

By way of comparison, the financing problems that led to the Social Security Amendments of 1977 were first identified in 1974. The time from trustees report issuance to enactment of the legislation was a little less than 4 years. In the case of the 1983 Amendments, the problems were first identified in 1979. Several minor sets of legislation helped postpone the need for major corrections. The overall time lag was, again, about 4 years. The actual declines in the OASDI fund ratio during the adverse periods ranged from about 8 to 10 percentage points per year.<sup>7</sup> These declines reflect the net effects of (1) temporary adverse economic conditions, (2) a probable (but hard to measure) difference between the assumed trend economic variables and the actual underlying trends, and (3) certain financing changes such as increases in tax rates and the maximum wage base that had been scheduled in earlier legislation. Considering the difficulties in interpreting the actual delays and declines, as well as the time required for new legislation to take effect, the recommended range of 60 to 130 percent seems reasonably consistent with actual past experience.

It is also interesting to compare the recommended contingency reserve range against the projected decline in the OASDI fund ratio under the alternative III assumptions from the *1990 Trustees Report* versus the alternative II-B assumptions. As noted earlier, by assuming current-cost financing based on alternative II-B, the reduction in the fund ratio under alternative III would be 38 percentage points after 5 years and 101 percentage points after 10 years. Thus, the pessimistic assumptions from the *1990 Trustees Report* would not produce as severe an effect on the fund ratio as is provided for by the recommended range. The difference arises from the assumed economic assumptions that, while fairly pessimistic, are not so adverse as the most extreme conditions actually experienced in prior years.

Future research in this area could be enhanced if alternative methodological approaches were investigated. For example, the effect of economic cycles on trust fund assets could be evaluated through use of an appropriate econometric model of the OASDI program. Although some

<sup>7</sup>The average decline during 1973 through 1978 was 8.5 percentage points. The declines during 1979 through 1982 were lower, primarily as a result of legislation. From January 1983 to January 1984, the OASDI fund ratio increased significantly. A decline of 12 percent would have occurred during this period in the absence of interfund borrowing (\$12.4 billion), advance tax transfers (\$13.5 billion), and the lump-sum general revenue transfers for military service credits and uncashed checks (\$20.3 billion).

important work has been performed in this general area (see, for example, Hambor [5], Johnson [6], Van de Water and Thompson [12], and also the *1981 OASDI Trustees Report* [3]), the studies to date have focused on issues other than asset needs. Another approach, currently in progress by the author, is to apply stochastic time series techniques to the development of alternative economic scenarios and to calculate the reduction in assets that would result under the more adverse extremes of the forecast scenarios. Finally, it also would be desirable to expand the evaluation of the noneconomic factors and to consider appropriate fund levels for OASI and DI separately.

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## DISCUSSION OF PRECEDING PAPER

ROBERT J. MYERS

Mr. Foster is to be congratulated for writing this monumental paper, which is destined to be the definitive work on the subject of how large the OASDI Trust Funds need to be to guard prudently against adverse contingencies. He concludes that a level of 100 percent for the fund ratio (fund balance at the beginning of the year as a percentage of the outgo in the year) would be a reasonable target.

As it so happens, the fund ratio at the beginning of 1993 was 107 percent. Thus, we now have a sufficiently large balance in the OASDI Trust Funds, and it would be perfectly safe to go ahead immediately with changing the financing basis of the program to pay-as-you-go financing, as has been advocated by Senator Daniel Patrick Moynihan (D-N.Y.).

Two minor comments on related matters dealt with in the paper are in order. First, Mr. Foster describes the special-issues investments held by the trust funds as representing "federal budget authority held in reserve." This is true as far as it goes, but there is more to the matter. These special issues are included in the amount reported as to our horrendous national debt. Further, if the excess of income over outgo that purchased these bonds had not been present, then an equal amount of "regular" bonds would have had to have been sold to the general public *in addition* to what already had been.

In passing, Mr. Foster states that OASDI has "generally operated on a 'current-cost' or 'pay-as-you-go' basis." A more accurate statement of this matter is the following excerpt from my paper, "Social Security's Funding Basis: Fiction and Fact," *Proceedings, Conference of Actuaries in Public Practice*, 1989 (pp. 272-276):

For about 20 years after its inception in 1935, the program was financed on a partial-reserve basis, although moving toward a current-cost (or pay-as-you-go) basis. Then, from the early 1960s until the early 1970s, current-cost financing was present, although not specifically legislated; the intention, however, was still to have partial-reserve financing over the long run.

Beginning in 1972, current-cost financing was made the official legislative policy. However, in the amendments of 1977, this policy was, *de facto*, reversed, in the sense that the Congress took actions that

implied a change in policy, but those actions were never explained in committee reports or floor debate. As a result, once again, partial-reserve financing over the long run was projected. The amendments of 1983, which resolved a serious financial crisis, made this approach of not intending current-cost financing over the long run even clearer—although again, with no congressional statement of intent thereon.

### (AUTHOR'S REVIEW OF DISCUSSION)

#### RICHARD S. FOSTER:

I thank Bob Myers for his generous comments about my paper. I hope that it proves to be useful in addressing this issue in the future.

Mr. Myers is of course quite correct that, for much of the OASDI program's history, financing for future years was established on the basis of partial advance funding. My point reflected the fact that during 1955–87, the taxes collected each year were fairly close to that year's expenditures. Thus, pay-as-you-go financing has tended to occur in practice, even though the future tax rates scheduled in the law often implied partial advance funding in the long run. I thank him for clarifying this point.

Mr. Myers also states that, in the absence of the OASDI Trust Fund buildup, the general public would have to have purchased Treasury bonds equal in amount to the growth in trust funds assets. This is correct *unless* the existence of the surplus OASDI revenues resulted in greater deficits in other (non-OASDI) federal programs. Many analysts believe that such deficits would have been lower without the ready availability of OASDI revenues to help meet them.

Whether the trust fund accumulation contributes to an increase in national savings depends directly on the answer to the above question. The issue is extremely important because higher savings could lead to faster economic growth in the future—which could make the nation more able and willing to meet the high costs associated with the retirement of the “baby boom” generation. This topic has been studied at some length in economic and social insurance forums but would benefit from more discussion within the actuarial profession.