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SUBSTITUTION OF FINAL AVERAGE SALARY FOR AVERAGE INDEXED MONTHLY EARNINGS IN DETERMINING PENSION PLAN OFFSETS

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ABSTRACT

The administration of social security "offset" retirement plans is complicated by the need (1) to secure wage history information and (2) to index each year's wages to age 60 (or earlier if ancillary benefits are payable with respect to termination prior to age 62).

The primary insurance amount (PIA) payable under social security is calculated on the basis of an employee's average indexed monthly earnings (AIME). The calculation of offset retirement plan benefits generally incorporates a fraction of the PIA. This paper explores the possibility of substituting a variant of the final average salary for the AIME. The acceptability of this substitution is critiqued (with illustrations).

I. INTRODUCTION

ADMINISTRATORS of offset-type defined benefit plans commonly encounter two difficulties when they attempt to calculate the primary insurance amount (PIA), which is the social security benefit payable to the insured worker upon retirement at age 65 or disablement at an earlier age (it does not include any dependents' benefits).

The first difficulty is in obtaining the earnings history from the Social Security Administration (SSA). This requires a signed request from the participant and several weeks' processing time by the SSA.

The second difficulty is in performing the calculation itself. While computer programs are used by some plans, calculations for many plans are done by hand on worksheets. The 1977 Amendments to the Social Security Act introduced a new step—indexing of the earnings history—in the already lengthy calculation procedure.

To eliminate the difficulties described above, while still retaining the desirable aspects of the offset design, various procedures have been developed for simulating the PIA. This paper discusses one such simulation, based on the substitution of the final average salary (FAS) for the average indexed monthly earnings (AIME).

II. THEORETICAL BASIS FOR SUBSTITUTING FAS FOR AIME

The AIME for age 62 is the monthly average of the n highest years of indexed covered earnings after 1950 and before the calendar year in which age 62 is attained. Earnings for years prior to the year of attainment of age 60 are indexed to that year. Actual earnings are used for the calendar years in which ages 60 and 61 are attained.

If it is assumed that the AIME always will be based on a series of wages that never exceed the maximum taxable earnings base in the year when such wages are earned,[1] and if it is also assumed that the employee always earns salary increases equivalent to those reflected by the social security wage-indexing factors,[2] then indexed pay obtained for every age less than 60 is the same as the pay at age 60. AIME, the n-year average of $n - 1$ years of age 60 pay and one year of pay at age 61, will be very close to age 60 pay.

The foregoing suggests the use of pay during the calendar year of the employee's sixtieth birthday as an approximation to the age 62 AIME. (Even though the AIME developed at an age after age 62 includes additional nonindexed wages, using salary during the year of attainment of age 60 as a substitute for AIME will nonetheless give a close approximation to the actual AIME.)

A particularly desirable alternative would be to base the AIME on the FAS of the participant as defined in the plan, rather than on pay during the calendar year of attainment of age 60. This alternative is desirable because the "positive" portion of the offset benefit generally is based on FAS (see the development of an offset formula converted into a step-rate formula in Sec. III). Note that a final three-calendar-year average salary at age 62 (average of salaries in calendar years of attainment of ages 59, 60, and 61) should closely approximate age 60 pay. (For purposes of this paper, final average salary is assumed to be based on a three-year average. Further adjustments are needed if final average salary is based on, say, a five-year average.)

The foregoing reasoning indicates that a close simulation of the PIA

[1] The assumption that every employee receives wages less than or equal to the maximum taxable earnings base is not valid but serves as a starting point for development. The assumption is not unreasonable, however, for employees first entering the work force in 1981 or later when the earnings base is $29,700. See discussion of this point in Sec. IV, C.

[2] The assumption that employees always will earn salary increases consistent with the national average is, again, a starting point for development. In point of fact, it becomes necessary to test the impact of salary histories with alternative patterns and slopes to determine the deviations from the AIME reflected by the assumption. See discussion in Sec. IV, A.

would result if the age 62 PIA formula (i.e., using "bend points"[3] applicable in the year of attainment of age 62) were applied to the final average salary at age 62. When retirement occurs after age 62, the age 62 PIA would be increased by the appropriate CPI indexing factors from the year of attainment of age 62 through the year of retirement. Of course, the *actual* maximum PIA would be substituted if it was lower than the simulated result.

III. COLLAPSING THE OFFSET BENEFIT CALCULATION INTO A SIMPLIFIED FORMULA BASED ON FAS AND BEND POINTS

If the offset benefit formula is of typical design, such as 60 percent of FAS minus 50 percent of PIA, and if the PIA may be expressed as a function of FAS and bend points, then the pension benefit formula may be simplified.

Given the assumptions that are the basis for the simulation in Section II, and following the procedure in Appendix I, then, if retirement occurs at age 62, the PIA may be expressed as a function of the FAS and the two bend points, BP1 and BP2.

PIA ≒ [90 percent of FAS up to BP1
+ 32 percent of FAS in excess of BP1 but less than BP2
+ 15 percent of FAS in excess of BP2], not greater than maximum PIA.

Collapsing and simplifying (as well as multiplying the PIA by 80 percent, because of the age 62 retirement), an offset plan benefit formula of 60 percent of FAS less one-half primary social security would be written as

24 percent of FAS up to BP1
+ 47.2 percent of FAS in excess of BP1 but less than BP2
+ 54 percent of FAS in excess of BP2 but less than the maximum AIME
+ 60 percent of FAS in excess of the AIME that produces the maximum PIA.

The variables BP1 and BP2, and the "maximum" AIME, would be automatically updated each calendar year, as is done in the case of a covered compensation table in a step-rate pension plan. The benefit would be prorated for less than a full career of service.

If the PIA were calculated in the same manner at ages above 62 as at

[3] "Bend points" are two constants defined in the social security law that are used in the calculation of the PIA.

age 62, any offset plan formula could be converted to a "mirror-image" step-rate formula as shown above. However, in order to use the bend points in the year of retirement and avoid CPI indexing between age 62 and retirement, an adjustment should be made to the PIA formula shown above (see discussion in Appendix II). The adjustment avoids systematically overstating the PIA used in the offset formula.

Using the development in Appendix II, we can approximate the PIA for retirement ages over 62 by applying [1 − 0.02 (age in year of retirement − 62)] to the PIA calculated by using the actual FAS (rather than the age 62 FAS) and the bend-point formula applicable to persons attaining age 62 in the *year of retirement* (as opposed to the bend-point formula for the year in which the employee attained age 62). The CPI-indexing operation is built into this approximating procedure. Again, the maximum PIA would be used if less than the amount described above.

The collapsing and simplifying procedure suggested for retirements at age 62 also could be introduced for such post–age 62 retirement formulas.

For terminations prior to age 62, the suggested benefit formula would be the same as the formula for retirement at age 62, using bend points in effect for retirements at age 62 for the year of termination.

IV. WEAKNESSES OF OFFSET SIMULATION FROM IRS POINT OF VIEW (DISCRIMINATION AND/OR VIOLATION OF INTEGRATION RULES)

A. *Salary Increases at Rates That Differ from Rate of Increase of Earnings Index*

The simulations described in the preceding sections were developed from the simplifying assumption that salaries increase at the same rate as the social security wage index. It is of interest to see what the results of the simulation would be if this assumption were not realized.

Appendix III consists of four tables showing the impact of variations in the salary increase assumption for retirement at age 62 and at age 65. As can be seen from Tables A and B of this appendix, a history of salary increases *less* than those in the earnings index results in an actual AIME in excess of FAS. In this case, the simulation produces a smaller offset than would otherwise apply. On the other hand, salary increases at a rate *in excess* of those in the earnings index result in the FAS exceeding the AIME (see Tables C and D). In this case, the simulated PIA is higher than the actual PIA, producing a larger offset than would otherwise apply.

How serious are these discrepancies vis-à-vis discrimination? It would seem that the only problems would be the cases in which salary increases exceed those in the earnings index. If it could be assumed that higher paid

employees are always awarded pay increases larger than those reflected by application of the earnings index and lower paid employees are always awarded increases at or below those reflected by application of the earnings index, one could argue that the resulting discrimination is "reverse" discrimination and therefore acceptable. However, this reasoning falls apart when low paid employees receive large (percentagewise) pay increases. Also, discrimination might exist between the very high paid employee and an employee slightly below the earnings base. The PIA would be exact for the very high paid employee because the maximum PIA would be used. However, the employee who is earning less than the earnings base but is receiving substantial promotional increases would have a simulated PIA in excess of the actual PIA.

B. *Breaks in Covered Employment*

The effect of the simulation procedure is to impute a complete salary history to the participant. If, in fact, the participant has an earnings record under social security of less than n years of coverage, the "zero" years would cause the actual PIA to be less than the simulated PIA. This situation will arise when an employee has been out of the work force or has worked for a noncovered employer such as the federal government.

C. *Earnings above Taxable Earnings Base for Part of Career*

For the years 1982 and later, automatic indexing will increase the 1981 taxable earnings base of $29,700 in accordance with changes in national average wages. Because it is anticipated that the 1981 base will cover the full wages of 94 percent of workers in covered employment, it may be assumed that the wages of most employees will be below the earnings base from 1981 forward.

Because of discontinuities in the progression of earnings bases prior to 1981 (for example, periods of several years when it was held constant, or the period of the large ad hoc increases of 1979–81), it is likely that employees who have wages below the earnings base in the later years of their careers will have had wages in excess of the earnings base for earlier years. See Appendix IV for an example. For such an employee, the use of FAS for AIME overstates the PIA.

V. COUNTERARGUMENTS

Before acknowledging the deficiency in the simulation procedure on the basis of the foregoing arguments, we should observe that the current integration rules also allow what seems to be discriminatory treatment of employees under certain conditions.

1. Consider two employees who work for ten years at the same pay and then terminate under an offset plan with the "zero future earnings" rule. The employee who worked from age 22 through age 31 will have an offset based on ten years of earnings and $n - 10$ zero future years. The employee who worked from age 47 through age 56 will have an offset based on n nonzero years if he has been working in covered employment since age 22.
2. Step-rate plans are based on the principle that a pension plan may replace a smaller proportion of wages below the earnings base than above, since the social security benefit (half employer-financed) is replacing wages below the base. But the employer may take just as much "credit" in the benefit formula for an employee who has not previously been covered by social security, and who retires after ten years of service with a small social security benefit, as for an employee with the identical history with the same employer but with prior covered earnings and a large social security benefit.

VI. LIKELIHOOD OF IMPLEMENTATION

As a practical matter, a plan sponsor will not incorporate a PIA simulation procedure in a pension plan without obtaining IRS approval. What are the prospects for qualification using a simulation such as the one described above? On the positive side:

It is understood that the IRS has already qualified plans that include a procedure for imputing a salary history from current (or final average) pay. The imputed salary history replaces the actual history in calculating the primary social security benefit for offset purposes. The authors have not personally obtained qualification for such a plan. However, it is understood from exchanges at professional meetings that such plans have been qualified by the IRS through the Chicago (and possibly other) offices. Significantly, IRS has *not* required the plan administrator to use a smaller offset if the employee can produce an earnings record (for example, in the case of a broken career) that would produce such offset.

On the basis of the foregoing, it would appear that a reasonable approximation would be accepted by IRS. Currently, one large corporate employer is using a simulated offset based on the substitution of FAS for AIME, but no ruling has been received from IRS.

On the negative side:

Even if the offset formula is translated into its mirror-image four-step configuration, it is still an offset, not a step-rate, plan. As such, it must satisfy the offset plan integration rules. Under a strict interpretation, it must be demonstrable that the simulated offset multiplied by the plan offset percentage does not exceed the maximum offset developed under Revenue Ruling 71-446. As shown above, it is impossible to prove this for all conceivable cases.

IRS representatives at the national office have recently voiced negative reactions to the simulation procedure described above, primarily because of discrimination against those below the earnings base (where the offset might

be somewhat overstated) as compared with those above (where the offset would be exact), and against employees with breaks in covered employment (the majority of whom might be female).

Until the IRS revises the integration rules, widespread use of this technique is not anticipated.

VII. ACKNOWLEDGMENT

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APPENDIX I

OUTLINE OF PROCEDURE FOR CALCULATION OF PIA (FOR EMPLOYEES BORN AFTER 1916) UNDER 1977 AMENDMENTS TO THE SOCIAL SECURITY ACT (DISREGARDING MINIMUMS)

1. For each calendar year of employment after 1950, record the lower of the annual earnings and the maximum taxable earnings base.
2. For the earnings of all years prior to the attainment of age 60, index (pursuant to a social security-promulgated table of average wages, by calendar year) the earnings from item 1 above to the year in which the employee attains age 60. Use nonindexed earnings for the calendar years in which age 60 and all later ages are attained.
3. Choose the n highest results in item 2, where $n = (\text{YOB} + 6) \not> 35$, and YOB is the last two digits of the year of birth.
4. AIME = (sum of n highest years' earnings from item 2) $\div$ ($12 \times n$), any cents in the result being dropped.
5. Compute the PIA as (90 percent of AIME up to the first bend point, BP1)[4] + (32 percent of AIME in excess of the first bend point but less than the second bend point, BP2) + (15 percent of AIME in excess of the second bend point). This may be written as

   15 percent of AIME
   + 17 percent of the lesser of AIME and BP2
   + 58 percent of the lesser of AIME and BP1.

6. Increase PIA to reflect cost-of-living increases from year of attainment of age 62 to year of attainment of retirement age.[5]

[4] Bend points are $180 (BP1) and $1,085 (BP2) for attainment of age 62 in 1979. Bend points for attainment of age 62 in 1980 and later reflect changes in the average wage in 1978 and later (two-year lag) as compared with that for 1977.

[5] Increase applicable to a particular year applies only for retirements in June of that year and subsequent months of that year.

7. Apply $\frac{5}{9}$ percent per month actuarial reduction if benefits commence before age 65, or $\frac{1}{4}$ percent per month actuarial increase if benefits commence after age 65 (no increases for months at or beyond age 72).

APPENDIX II

DISCUSSION OF SIMPLIFYING ASSUMPTIONS LEADING TO ADJUSTMENT PRESENTED IN SECTION III FOR RETIREMENT AT AGES GREATER THAN 62

1. If

CPI = Average annual rate of increase in CPI as used to compute social security benefits;

WB = Average annual rate of increase in national wages (earnings index);

S = Average annual rate of increase in FAS;

BP1(X) = First bend point used in benefit calculation for a person retiring at age 62 in the same calendar year in which the participant attains age X;

BP2(X) = Second bend point used in benefit calculation for a person retiring at age 62 in the same calendar year in which the participant attains age X;

AIME(X) = Actual AIME at age X;

FAS(X) = Final average salary at age X (i.e., average of salaries in calendar years of attainment of ages $X - 3$, $X - 2$, and $X - 1$),

then the age $(62 + K)$ PIA—prior to the cost-of-living increase applicable to June of the year of retirement, and ignoring actuarial increases or reductions—may be expressed as

$$(1 + \text{CPI})^K[[0.15[\text{AIME}(62 + K)] + 0.17 \times \{\text{smaller of } [\text{AIME}(62 + K) \text{ and } \text{BP2}(62)]\} + 0.58 \times \{\text{smaller of } [\text{AIME}(62 + K) \text{ and } \text{BP1}(62)]\}]].$$

2. But

$$\text{BP1}(62) = \text{BP1}(62 + K) \div (1 + \text{WB})^K$$

and

$$\text{BP2}(62) = \text{BP2}(62 + K) \div (1 + \text{WB})^K.$$

Also (as noted in Sec. II), $\text{AIME}(62 + K) \doteq \text{AIME}(62)$, and (assuming earnings below the maximum taxable earnings base), $\text{AIME}(62) \doteq \text{FAS}(62)$.

3. Now, $\text{FAS}(62) = \text{FAS}(62 + K) \div (1 + S)^K$. If we assume that S and WB are approximately equal, we have

$$\text{AIME}(62 + K) \doteq \text{FAS}(62 + K) \div (1 + \text{WB})^K.$$

Substituting these results in the formula for the age $(62 + K)$ PIA, we obtain the following approximation:

$$\frac{(1 + \text{CPI})^K}{(1 + \text{WB})^K}[[0.15[\text{FAS}(62 + K)] + 0.17\{\text{smaller of } [\text{FAS}(62 + K) \text{ and } \text{BP2}(62 + K)]\} + 0.58\{\text{smaller of } [\text{FAS}(62 + K) \text{ and } \text{BP1}(62 + K)]\}]].$$

In summary, the FAS and the bend points at retirement age are used (as in the age 62 method), but an adjustment factor is applied that reflects the difference over K years between the CPI and the average increase in the wage base.

4. On the basis of the 1977 OASDI trustees' report assumptions (intermediate set), which (for years after 1983) assume CPI = 4 percent and WB = 5.75 percent,

$$\frac{1+\text{CPI}}{1 + \text{WB}} \doteq 0.983 .$$

5. It should be noted that the adjustment factor depends on the ratio of $(1 + \text{CPI})$ to $(1 + \text{WB})$, not on their absolute size. Thus, the factor 0.983 could be used in any situation where the difference in CPI and WB is approximately $1\frac{3}{4}$ percent.
6. In view of the approximations used in arriving at this result, it may be deemed appropriate to use an adjustment ratio that would produce a smaller offset, to compensate for the cases in which this approximation might produce a larger offset than that obtained by using the actual PIA. One possibility would be to use a linear adjustment of -2 percent for each year after age 62. The formulas then would be the following:

Age 62:

$$0.15[\text{FAS}(62)] + 0.17\{\text{smaller of } [\text{FAS}(62) \text{ and } \text{BP2}(62)]\} + 0.58\{\text{smaller of FAS}(62) \text{ and } \text{BP1}(62)]\} .$$

Age 63:

$$0.98[[0.15[\text{FAS}(63)] + 0.17\{\text{smaller of } [\text{FAS}(63) \text{ and } \text{BP2}(63)]\} + 0.58\{\text{smaller of } [\text{FAS}(63) \text{ and } \text{BP1}(63)]\}]] .$$

Age 64:

$$0.96[[0.15[\text{FAS}(64)] + 0.17\{\text{smaller of } [\text{FAS}(64) \text{ and } \text{BP2}(64)]\} + 0.58\{\text{smaller of } [\text{FAS}(64) \text{ and } \text{BP1}(64)]\}]] .$$

Age 65:

$$0.94[[0.15[\text{FAS}(65)] + 0.17\{\text{smaller of [FAS}(65) \text{ and BP2}(65)]\} + 0.58\{\text{smaller of [FAS}(65) \text{ and BP1}(65)]\}]] .$$

APPENDIX III

IMPACT OF SALARY INCREASES DIFFERENT FROM THOSE IN EARNINGS INDEX

Assumed increases in national average wages (earnings index), and in the consumer price index, are recorded in the 1977 OASDI trustees' report (House Doc. No. 95-150 [intermediate assumption set]).[6] Assumed increases in national wages are as follows:

Year	Percentage Increase from Previous Year
1977	8.4%
1978	8.1
1979	7.8
1980	7.1
1981	6.4
1982	6.0
1983 and later	5.75

Assumed increases in the consumer price index are as follows:

Year	Percentage Increase
1978	5.5%
1979	5.2
1980	5.0
1981	4.2
1982 and later	4.0

Tables A–D of this appendix are based on the above assumed increases in the consumer price index, but on different assumed increases in national average wages, as indicated in the headings of the tables.

[6] The 1978 trustees' report (House Doc. 95-336) has somewhat similar assumptions. The same ultimate ones are used, but they are reached in 1985 for the CPI and in 2000 for the wage increases.

TABLE A

RETIREMENT AT AGE 62: SALARY INCREASES AT 90 PERCENT OF RATE OF INCREASE OF EARNINGS INDEX

Calendar Year (1)	Age (2)	Salary (3)	Salary Increase (%) over Prior Year (4)	Maximum Covered Earnings (5)	Smaller of (3) and (5) (6)	Index (7)	Indexed Earnings [(6)×(7)] (8)	35 Highest Years from (8) (9)
1976	22	$ 15,000	N.A.	$ 15,300	$ 15,000	9.130251	$136,954	$ 136,954
1977	23	16,134	7.560%	16,500	16,134	8.422741	135,893	135,893
1978	24	17,310	7.290	17,700	17,310	7.791620	134,873	134,873
1979	25	18,525	7.020	22,900	18,525	7.227848	133,896	133,896
1980	26	19,709	6.390	25,900	19,709	6.748691	133,010	133,010
1981	27	20,844	5.760	29,700	20,844	6.342754	132,208	132,208
1982	28	21,970	5.400	31,800	21,970	5.983731	131,463	131,463
1983	29	23,107	5.175	33,900	23,107	5.658374	130,748	130,748
1984	30	24,302		36,000	24,302	5.350708	130,033	130,033
1985	31	25,560		38,100	25,560	5.059772	129,328	129,328
1986	32	26,884		40,200	26,884	4.784654	128,631	128,631
1987	33	28,274		42,600	28,274	4.524495	127,926	127,926
1988	34	29,737		45,000	29,737	4.278483	127,229	127,229
1989	35	31,276		47,700	31,276	4.045846	126,538	126,538
1990	36	32,895		50,400	32,895	3.825860	125,852	125,852
1991	37	34,597		53,400	34,597	3.617834	125,166	125,166
1992	38	36,388		56,400	36,388	3.421120	124,488	124,488
1993	39	38,271		59,700	38,271	3.235101	123,811	123,811
1994	40	40,251		63,000	40,251	3.059198	123,136	123,136
1995	41	42,334		66,600	42,334	2.892858	122,466	122,466
1996	42	44,525		70,500	44,525	2.735563	121,801	121,801
1997	43	46,829		74,700	46,829	2.586821	121,138	121,138
1998	44	49,253		78,900	49,253	2.446167	120,481	120,481
1999	45	51,801		83,400	51,801	2.313160	119,824	119,824
2000	46	54,482		88,200	54,482	2.187385	119,173	119,173
2001	47	57,302		93,300	57,302	2.068449	118,526	118,526
2002	48	60,267		98,700	60,267	1.955980	117,881	117,881
2003	49	63,386		104,400	63,386	1.849627	117,240	117,240
2004	50	66,666		110,400	66,666	1.749056	116,603	116,603
2005	51	70,116		116,700	70,116	1.653954	115,969	115,969
2006	52	73,744		123,300	73,744	1.564023	115,337	115,337
2007	53	77,561		130,500	77,561	1.478981	114,711	114,711
2008	54	81,575		138,000	81,575	1.398564	114,088	114,088
2009	55	85,796		145,800	85,796	1.322519	113,467	113,467
2010	56	90,236		154,200	90,236	1.250609	112,850	.....
2011	57	94,906		163,200	94,906	1.182609	112,237	.....
2012	58	99,817		172,500	99,817	1.118306	111,626	.....
2013	59	104,983		182,400	104,983	1.057500	111,020	.....
2014	60	110,415		192,900	110,415	1.000000	110,415	.....
2015	61	116,129	↓	204,000	116,129	1.000000	116,129	116,129
Total	.....	.....	.....	.....	.....	.....	.....	$4,346,017

CALCULATIONS BASED ON TABLE A

1. AIME = $4,346,017 ÷ 35 ÷ 12 = $10,347.
2. PIA based on AIME* = 0.90($1,516) + 0.32($7,623) + 0.15($10,347 − $9,139) = $3,985.
3. Monthly FAS = ($104,983 + $110,415 + $116,129) ÷ 3 ÷ 12 = $9,209.
4. Simulated PIA based on FAS* = 0.90($1,516) + 0.32($7,623) + 0.15($9,209 − $9,139) = $3,814.
5. Simulated PIA as a percentage of actual PIA = $3,814 ÷ $3,985 = 95.7 percent.

* Bend points for persons attaining age 62 in the year 2016 are based on 1977 OASDI trustees' report assumptions.

TABLE B

RETIREMENT AT AGE 65: SALARY INCREASES AT 90 PERCENT OF RATE OF INCREASE OF EARNINGS INDEX

Calendar Year	Age	Salary	Salary Increase (%) over Prior Year	Maximum Covered Earnings	Smaller of (3) and (5)	Index	Indexed Earnings [(6)×(7)]	35 Highest Years from (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1976	22	$ 15,000	N.A.	$ 15,300	$ 15,000	9.130251	$136,954	$ 136,954
1977	23	16,134	7.560%	16,500	16,134	8.422741	135,893	135,893
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1989	35	31,276		47,700	31,276	4.045846	126,538	126,538
1990	36	32,895		50,400	32,895	3.825860	125,852	125,852
1991	37	34,597		53,400	34,597	3.617834	125,166	125,166
1992	38	36,388		56,400	36,388	3.421120	124,488	124,488
1993	39	38,271		59,700	38,271	3.235101	123,811	123,811
1994	40	40,251		63,000	40,251	3.059198	123,136	123,136
1995	41	42,334		66,600	42,334	2.892858	122,466	122,466
1996	42	44,525		70,500	44,525	2.735563	121,801	121,801
1997	43	46,829		74,700	46,829	2.586821	121,138	121,138
1998	44	49,253		78,900	49,253	2.446167	120,481	120,481
1999	45	51,801		83,400	51,801	2.313160	119,824	119,824
2000	46	54,482		88,200	54,482	2.187385	119,173	119,173
2001	47	57,302		93,300	57,302	2.068449	118,526	118,526
2002	48	60,267		98,700	60,267	1.955980	117,881	117,881
2003	49	63,386		104,400	63,386	1.849627	117,240	117,240
2004	50	66,666		110,400	66,666	1.749056	116,603	116,603
2005	51	70,116		116,700	70,116	1.653954	115,969	115,969
2006	52	73,744		123,300	73,744	1.564023	115,337	115,337
2007	53	77,561		130,500	77,561	1.478981	114,711	.....
2008	54	81,575		138,000	81,575	1.398564	114,088	.....
2009	55	85,796		145,800	85,796	1.322519	113,467	.....
2010	56	90,236		154,200	90,236	1.250609	112,850	.....
2011	57	94,906		163,200	94,906	1.182609	112,237	.....
2012	58	99,817		172,500	99,817	1.118306	111,626	.....
2013	59	104,983		182,400	104,983	1.057500	111,020	.....
2014	60	110,415		192,900	110,415	1.000000	110,415	.....
2015	61	116,129		204,000	116,129	1.000000	116,129	116,129
2016	62	122,139		215,700	122,139	1.000000	122,139	122,139
2017	63	128,460		228,000	128,460	1.000000	128,460	128,460
2018	64	135,108		241,200	135,108	1.000000	135,108	135,108
Total	.....	.....	.....	.....	.....	.....	.....	$4,389,458

CALCULATIONS BASED ON TABLE B

1. AIME = $4,389,458 ÷ 35 ÷ 12 = $10,451.
2. PIA based on AIME* = $(1.04)^3[0.90($1,516) + 0.32($7,623) + 0.15($10,451 - $9,139)] = $4,500.
3. Monthly FAS = ($122,139 + $128,460 + $135,108) ÷ 3 ÷ 12 = $10,714.
4. Simulated PIA based on FAS† = 0.94[0.90($1,793) + 0.32($10,714 − $1,793)] = $4,200.
5. Simulated PIA as a percentage of actual PIA = $4,200 ÷ $4,500 = 93.3 percent.

* Bend points for persons attaining age 62 in the year 2016 and CPI increases are based on 1977 OASDI trustees' report assumptions.

† Bend points for persons attaining age 62 in the year 2019 are based on 1977 OASDI trustees' report assumptions.

TABLE C

RETIREMENT AT AGE 62: SALARY INCREASES AT RATE OF INCREASE OF EARNINGS INDEX PLUS 1 PERCENT

Calendar Year (1)	Age (2)	Salary (3)	Salary Increase (%) over Prior Year (4)	Maximum Covered Earnings (5)	Smaller of (3) and (5) (6)	Index (7)	Indexed Earnings [(6)×(7)] (8)	35 Highest Years from (8) (9)
1976	22	$ 15,000	N.A.	$ 15,300	$ 15,000	9.130251	$136,954	
1977	23	16,410	9.4%	16,500	16,410	8.422741	138,217	
1978	24	17,903	9.1	17,700	17,700	7.791620	137,912	
1979	25	19,479	8.8	22,900	19,479	7.227848	140,791	
1980	26	21,057	8.1	25,900	21,057	6.748691	142,107	
1981	27	22,615	7.4	29,700	22,615	6.342754	143,441	$ 143,441
1982	28	24,198	7.0	31,800	24,198	5.983731	144,794	144,794
1983	29	25,831	6.75	33,900	25,831	5.658374	146,161	146,161
1984	30	27,575		36,000	27,575	5.350708	147,546	147,546
1985	31	29,436		38,100	29,436	5.059772	148,939	148,939
1986	32	31,423		40,200	31,423	4.784654	150,348	150,348
1987	33	33,544		42,600	33,544	4.524495	151,770	151,770
1988	34	35,808		45,000	35,808	4.278483	153,204	153,204
1989	35	38,225		47,700	38,225	4.045846	154,652	154,652
1990	36	40,805		50,400	40,805	3.825860	156,114	156,114
1991	37	43,560		53,400	43,560	3.617834	157,593	157,593
1992	38	46,500		56,400	46,500	3.421120	159,082	159,082
1993	39	49,639		59,700	49,639	3.235101	160,587	160,587
1994	40	52,989		63,000	52,989	3.059198	162,104	162,104
1995	41	56,566		66,600	56,566	2.892858	163,637	163,637
1996	42	60,384		70,500	60,384	2.735563	165,184	165,184
1997	43	64,460		74,700	64,460	2.586821	166,746	166,746
1998	44	68,811		78,900	68,811	2.446167	168,323	168,323
1999	45	73,456		83,400	73,456	2.313160	169,915	169,915
2000	46	78,414		88,200	78,414	2.187385	171,522	171,522
2001	47	83,707		93,300	83,707	2.068449	173,144	173,144
2002	48	89,357		98,700	89,357	1.955980	174,781	174,781
2003	49	95,389		104,400	95,389	1.849627	176,434	176,434
2004	50	101,828		110,400	101,828	1.749056	178,103	178,103
2005	51	108,701		116,700	108,701	1.653954	179,786	179,786
2006	52	116,039		123,300	116,039	1.564023	181,488	181,488
2007	53	123,871		130,500	123,871	1.478981	183,203	183,203
2008	54	132,233		138,000	132,233	1.398564	184,936	184,936
2009	55	141,158		145,800	141,158	1.322519	186,684	186,684
2010	56	150,686		154,200	150,686	1.250609	188,449	188,449
2011	57	160,858		163,200	160,858	1.182609	190,232	190,232
2012	58	171,716		172,500	171,716	1.118306	192,031	192,031
2013	59	183,307		182,400	182,400	1.057500	192,888	192,888
2014	60	195,680		192,900	192,900	1.000000	192,900	192,900
2015	61	208,888		204,000	204,000	1.000000	204,000	204,000
Total								$5,920,721

CALCULATIONS BASED ON TABLE C

1. AIME = $5,920,721 ÷ 35 ÷ 12 = $14,096.
2. PIA based on AIME* = 0.90($1,516) + 0.32($7,623) + 0.15($14,096 − $9,139) = $4,547.
3. Monthly FAS = ($183,307 + $195,680 + $208,888) ÷ 3 ÷ 12 = $16,330.
4. Simulated PIA based on FAS* = 0.90($1,516) + 0.32($7,623) + 0.15($16,330 − $9,139) = $4,882.
5. Simulated PIA as a percentage of actual PIA = $4,882 ÷ $4,547 = 107.4 percent.

* Bend points for persons attaining age 62 in the year 2016 are based on 1977 OASDI trustees' report assumptions.

TABLE D

RETIREMENT AT AGE 65: SALARY INCREASES AT RATE OF INCREASE OF EARNINGS INDEX PLUS 1 PERCENT

Calendar Year (1)	Age (2)	Salary (3)	Salary Increase (%) over Prior Year (4)	Maximum Covered Earnings (5)	Smaller of (3) and (5) (6)	Index (7)	Indexed Earnings [(6)×(7)] (8)	35 Highest Years from (8) (9)
1976	22	$ 15,000	N.A.	$ 15,300	$ 15,000	9.130251	$136,954	.....
1977	23	16,410	9.4%	16,500	16,410	8.422741	138,217	.....
1978	24	17,903	9.1	17,700	17,700	7.791620	137,912	.....
1979	25	19,479	8.8	22,900	19,479	7.227848	140,791	.....
1980	26	21,057	8.1	25,900	21,057	6.748691	142,107	.....
1981	27	22,615	7.4	29,700	22,615	6.342754	143,441	.....
1982	28	24,198	7.0	31,800	24,198	5.983731	144,794	.....
1983	29	25,831	6.75	33,900	25,831	5.658374	146,161	.....
1984	30	27,575		36,000	27,575	5.350708	147,546	$ 147,546
1985	31	29,436		38,100	29,436	5.059772	148,939	148,939
1986	32	31,423		40,200	31,423	4.784654	150,348	150,348
1987	33	33,544		42,600	33,544	4.524495	151,770	151,770
1988	34	35,808		45,000	35,808	4.278483	153,204	153,204
1989	35	38,225		47,700	38,225	4.045846	154,652	154,652
1990	36	40,805		50,400	40,805	3.825860	156,114	156,114
1991	37	43,560		53,400	43,560	3.617834	157,593	157,593
1992	38	46,500		56,400	46,500	3.421120	159,082	159,082
1993	39	49,639		59,700	49,639	3.235101	160,587	160,587
1994	40	52,989		63,000	52,989	3.059198	162,104	162,104
1995	41	56,566		66,600	56,566	2.892858	163,637	163,637
1996	42	60,384		70,500	60,384	2.735563	165,184	165,184
1997	43	64,460		74,700	64,460	2.586821	166,746	166,746
1998	44	68,811		78,900	68,811	2.446167	168,323	168,323
1999	45	73,456		83,400	73,456	2.313160	169,915	169,915
2000	46	78,414		88,200	78,414	2.187385	171,522	171,522
2001	47	83,707		93,300	83,707	2.068449	173,144	173,144
2002	48	89,357		98,700	89,357	1.955980	174,781	174,781
2003	49	95,389		104,400	95,389	1.849627	176,434	176,434
2004	50	101,828		110,400	101,828	1.749056	178,103	178,103
2005	51	108,701		116,700	108,701	1.653954	179,786	179,786
2006	52	116,039		123,300	116,039	1.564023	181,488	181,488
2007	53	123,871		130,500	123,871	1.478981	183,203	183,203
2008	54	132,233		138,000	132,233	1.398564	184,936	184,936
2009	55	141,158		145,800	141,158	1.322519	186,684	186,684
2010	56	150,686		154,200	150,686	1.250609	188,449	188,449
2011	57	160,858		163,200	160,858	1.182609	190,232	190,232
2012	58	171,716		172,500	171,716	1.118306	192,031	192,031
2013	59	183,307		182,400	182,400	1.057500	192,888	192,888
2014	60	195,680		192,900	192,900	1.000000	192,900	192,900
2015	61	208,888		204,000	204,000	1.000000	204,000	204,000
2016	62	222,989		215,700	215,700	1.000000	215,700	215,700
2017	63	238,041		228,000	228,000	1.000000	228,000	228,000
2018	64	254,109		241,200	241,200	1.000000	241,200	241,200
Total	.....	.....	.....	.....	.....	.....	.....	$6,171,225

CALCULATIONS BASED ON TABLE D

1. AIME = $6,171,225 ÷ 35 ÷ 12 = $14,693.
2. PIA based on AIME* = $(1.04)^3[0.90($1,516) + 0.32($7,623) + 0.15($14,693 - $9,139)] = $5,216.
3. Monthly FAS = ($222,989 + $238,041 + $254,109) ÷ 3 ÷ 12 = $19,865.
4. Simulated PIA based on FAS† = 0.94[0.90($1,793) + 0.32($9,015) + 0.15($19,865 − $10,808)] = $5,506.
5. Simulated PIA as a percentage of actual PIA = $5,506 ÷ $5,216 = 105.6 percent.

* Bend points for persons attaining age 62 in the year 2016 and CPI increases are based on 1977 OASDI trustees' report assumptions.

† Bend points for persons attaining age 62 in the year 2019 are based on 1977 OASDI trustees' report assumptions.

APPENDIX IV

RETIREMENT AT AGE 62: SALARY INCREASES SAME AS RATE OF INCREASE OF EARNINGS INDEX, BUT WITH SOME EARLY CAREER SALARIES EXCEEDING MAXIMUM COVERED EARNINGS

Calendar Year	Age	Salary	Salary Increase (%) over Prior Year	Maximum Covered Earnings	Smaller of (3) and (5)	Index	Indexed Earnings [(6)×(7)]	28 Highest Years from (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1951	29	$ 4,139	N.A.	$ 3,600	$ 3,600	5.026426	$18,095	$ 18,095
1952	30	4,371	5.6%	3,600	3,600	4.759873	17,136	17,136
1953	31	4,655	6.5	3,600	3,600	4.469364	16,090	16,090
1954	32	4,715	1.3	3,600	3,600	4.412008	15,883	15,883
1955	33	4,894	3.8	4,200	4,200	4.250489	17,852	17,852
1956	34	5,173	5.7	4,200	4,200	4.021277	16,889	16,889
1957	35	5,463	5.6	4,200	4,200	3.808027	15,994	15,994
1958	36	5,643	3.3	4,200	4,200	3.686377	15,483	.....
1959	37	5,830	3.3	4,800	4,800	3.568613	17,129	17,129
1960	38	6,080	4.3	4,800	4,800	3.421489	16,423	16,423
1961	39	6,275	3.2	4,800	4,800	3.315396	15,914	15,914
1962	40	6,545	4.3	4,800	4,800	3.178711	15,258	.....
1963	41	6,702	2.4	4,800	4,800	3.104210	14,900	.....
1964	42	6,910	3.1	4,800	4,800	3.010873	14,452	.....
1965	43	7,020	1.6	4,800	4,800	2.963458	14,225	.....
1966	44	7,329	4.4	6,600	6,600	2.838561	18,735	18,735
1967	45	7,791	6.3	6,600	6,600	2.670330	17,624	17,624
1968	46	8,336	7.0	7,800	7,800	2.495636	19,466	19,466
1969	47	8,770	5.2	7,800	7,800	2.372277	18,504	18,504
1970	48	9,226	5.2	7,800	7,800	2.255017	17,589	17,589
1971	49	9,788	6.1	7,800	7,800	2.125369	16,578	16,578
1972	50	10,650	8.8	9,000	9,000	1.953464	17,581	17,581
1973	51	11,193	5.1	10,800	10,800	1.858672	20,074	20,074
1974	52	11,864	6.0	13,200	11,864	1.753464	20,804	20,804
1975	53	12,754	7.5	14,100	12,754	1.631129	20,804	20,804
1976	54	13,634	6.9	15,300	13,634	1.525846	20,804	20,804
1977	55	14,780	8.4	16,500	14,780	1.407607	20,804	20,804
1978	56	15,977	8.1	17,700	15,977	1.302134	20,804	20,804
1979	57	17,223	7.8	22,900	17,223	1.207917	20,804	20,804
1980	58	18,446	7.1	25,900	18,446	1.127840	20,804	20,804
1981	59	19,626	6.4	29,700	19,626	1.060000	20,804	20,804
1982	60	20,804	6.0	31,800	20,804	1.000000	20,804	20,804
1983	61	22,000	5.75	33,900	22,000	1.000000	22,000	22,000
Total	.....	.....	.....	.....	.....	.....	.....	$522,792

CALCULATIONS BASED ON APPENDIX IV

1. AIME = $522,792 ÷ 28 ÷ 12 = $1,555.
2. PIA based on AIME* = 0.90($253) + 0.32($1,274) + 0.15($1,555 − $1,527) = $640.
3. Monthly FAS = ($19,626 + $20,804 + $22,000) ÷ 3 ÷ 12 = $1,734 (Note: this is less than maximum AIME of $1,736.)
4. Simulated PIA based on FAS* = 0.90($253) + 0.32($1,274) + 0.15($1,734 − $1,527) = $666.
5. Simulated PIA as a percentage of actual PIA = $666 ÷ $640 = 104.1 percent.

* Bend points for persons attaining age 62 in the year 1984 are based on 1977 OASDI trustees' report assumptions.

DISCUSSION OF PRECEDING PAPER

MICHAEL R. GROSS:

The development of any method of approximating an employee's PIA should take into account the following three goals: (1) the method should eliminate the necessity of obtaining the employee's earnings history from SSA; (2) the method should result in a simplified calculation procedure; and (3) the method should produce results that are accurate within acceptable limits. There probably is no approximation technique that satisfies all three goals to the maximum extent in all possible situations. Each method, then, is a compromise between accuracy and simplicity.

For a plan in which the "positive" portion of the benefit formula involves a final three-year average salary, the authors' method meets goals 1 and 2. No external record of earnings is required, and the complex PIA calculation is reduced to a simple four-step formula involving quantities that remain constant for an entire year.

As the authors point out, the major drawback to their method is in the area of accuracy. Specifically, the "acceptable limits" of accuracy (in the opinion of the IRS) might not be met for employees with certain earnings patterns and for employees with breaks in covered employment. The overstatement of PIA for such employees should not be justified by pointing to other examples of discrimination in the integration rules. Rather, if the method is justifiable, it should stand on its own merits.

I would like to review two other PIA approximation methods. Neither one is as simple as the authors' method; however, each has desirable factors.

Method 1: earnings history with employer

Under this method, the PIA is computed using only covered earnings paid by the employer maintaining the plan. The earnings history is available from employment records, and "accuracy" is assured by indexing each year's earnings and applying the AIME to the correct PIA formula. While this method cannot be called simple, it does avoid discrimination problems.

Method 2: endpoint method

Under this method, the AIME is approximated by taking the average of the indexed covered earnings at the "indexing age" and the "beginning age." The indexing age is 60 for retirements; for terminations, it is the age two years prior to the termination. The beginning age is n years prior to retirement or termination (some modifications to this definition are required under certain circumstances). Earnings at the beginning age can be actual earnings or esti-

mated earnings. Alternatively, the beginning age can be defined as the age during the first full year of employment with the employer maintaining the plan, so that the use of actual earnings will be assured for all employees.

The approximate AIME is applied to the PIA formula for the year in which the employee attains age 62 (or the year of termination, if earlier). CPI increases after age 62 are applied to derive the employee's approximate PIA.

The endpoint method adjusts, to a greater extent than does the FAS substitution method, for salary histories that do not follow the pattern of nationwide average wages, and for salary histories in which some early salaries exceed the wage bases. On the other hand, the FAS substitution method is much simpler.

Whether or not the endpoint method is accurate is a matter of opinion. For the five examples illustrated by the authors (Tables A–D and Appendix IV), this method results in ratios of simulated PIA to actual PIA of 0.991, 0.984, 0.997, 0.984, and 1.003, respectively. However, the results are not as good for other examples. Most important, there is no guarantee that discrimination against low-paid employees will not occur. If this method is applied only over the years of employment rather than over all years, the problem of breaks in covered employment can be overcome.

The key factor in determining whether a PIA approximation method is acceptable is the attitude of the IRS, as expressed by national office personnel. Basic integration rules themselves are approximations. This is not a fault of the rules but merely a result of the complexity of the OASDI benefit structure. Similarly, it would be desirable to simplify the administration of offset plans through the use of reasonable offset approximations. Guidelines for such approximations should be developed along with new integration rules.

IRA I. SIEGLER:

This paper covers one aspect of an area that has been fraught with concern for many years—the administration of offset plans. The authors discuss a complex approximation for determining offsets, which generally would apply only to small companies who do not have either the in-house or consultant computer capability to calculate the social security PIA from actual pay records, or to estimate it through a back-pay simulation working from either current or final-average pay.

As a firm, we have struggled with similar problems in this area. We feel, however, that some of the authors' concerns are overstated and some of those that are not can be overcome by more sophisticated, generally computerized, simulation techniques.

Given that a computerized capability is lacking (an assumption that surely will decrease in accuracy with the growth of "small" computers)

and that an "exact" computation is out of the question because of either the time required to obtain full historical records from SSA, reluctance on the part of the employee to request such records, or other considerations, let us examine the advantages and deficiencies of the proposal in particular and of simulation techniques in general. Section numbers in this discussion refer to the sections in the paper.

Section II: "Theoretical Basis for Substituting FAS for AIME"

The assumption that age 60 pay (and thus three-year FAS at age 62) will closely approximate AIME at age 62, which is the average of "$n - 1$ years of age 60 pay and one year of pay at age 61," is based on the assumptions that (1) no prior year's pay exceeded that year's taxable wage base *and* (2) prior years' pays increased in accordance with the increase in national average wages. While assumption 2 is generally reasonable, assumption 1, as Table 1 of this

TABLE 1

MAXIMUM EARNINGS DURING CALENDAR YEARS 1951–78 SUCH THAT (1) NONE EXCEEDED THAT YEAR'S TAXABLE WAGE BASE AND (2) EARNINGS INCREASED IN ACCORDANCE WITH THE INCREASE IN NATIONAL AVERAGE WAGES

Year	Earnings	Year	Earnings	Year	Earnings
1951	$ 2,884.05	1961	$ 4,210.69	1971	$ 6,694.11
1952	3,063.49	1962	4,421.54	1972	7,350.14
1953	3,234.65	1963	4,529.97	1973	7,810.04
1954	3,251.34	1964	4,715.10	1974	8,274.30
1955	3,401.56	1965	4,800.00	1975	8,892.66
1956	3,639.48	1966	5,088.12	1976	9,506.28
1957	3,752.16	1967	5,371.54	1977	10,076.01
1958	3,785.21	1968	5,740.73	1978	10,876.15
1959	3,972.73	1969	6,072.49		
1960	4,128.64	1970	6,373.84		

discussion shows, would have required a relatively low pattern of wages in the past. Since this approach is therefore not appropriate for currently retiring employees, we would suggest that it be shelved for the near-term future. (Note that assumption 1 above would not be a problem in computerized simulation techniques that create a hypothetical back-pay series, limit it to the tax base in effect each year, and then index to age 60.)

Section III: "Collapsing the Offset Benefit Calculation into a Simplified [?] *Formula Based on FAS and Bend Points"*

Is a benefit formula of "24 percent of FAS up to BP1, plus 47.2 percent of FAS between BP1 and BP2, plus 54 percent of FAS between BP2 and maximum AIME, plus 60 percent of FAS in excess of maximum AIME" *really* simpler than "60 percent of FAS minus 50 percent of PIA"? In addition, the

proposed formula applies only at age 62, so the number of formulas required would be anywhere from 4 (covering ages 62–65) to 8 (if the CPI is recognized for retirements after May of a particular calendar year) to 9 (if the ages covered extend to 70) to *18* (if both age 70 and dual CPI are recognized), and virtually all of these must be updated every year that the indexing factors and/or CPI are updated. Do the authors plan to publish the formula to participants each year as part of the Summary Plan Description disclosure?

If the objective is to avoid the appearance of an offset plan, the formula could be expressed as "10 percent of the estimated social security amount, plus 60 percent of the excess of FAS over the social security amount." I feel that any attempt to describe the social security benefit by means of its formula would only befuddle plan administrators and participants.

The linear adjustment of −2 percent for each year of age above 62 (see also Appendix II of the paper) applies reasonably well where the difference between the national average wage increase and the CPI is positive and greater than 2 percent. Indeed, it is as arbitrary as any. However, it falls down somewhat in times such as those we are now enduring, where the ratio of (1 + CPI) to (1 + WB) will be in excess of 1 (indeed, closer to 1.05) rather than 0.98. In such a situation the plan sponsor is not taking as much credit as is allowable.

The exclusion of the transitional minimum calculation also tends to understate the offset for employees born in the period 1917–21, especially in the "zero future earnings" case.

Section V: "Counterarguments"

The two permitted discriminatory treatment positions stated, which do indeed exist and are not likely to be changed in the near future, are not necessarily counterarguments. The first seems to be "cured" by this simulation approach, since both employees will have the same offset, and this is potentially desirable in the case of terminations of employment prior to age 62. The second seems to take the attitude that "since step-up plans can discriminate, why can't offset plans?" which is an argument neither for nor against the paper, but rather an argument to either allow offsets of up to the *maximum* PIA rather than the actual (or estimated), or reduce the amount of permitted integration in step-up plans.

Section VI: "Likelihood of Implementation"

As the authors state, "It is understood that the IRS has already qualified plans that include a procedure for imputing a salary history from current (or final average) pay." The authors also state: "Until the IRS revises the integration rules, widespread use of this technique is not anticipated." In summary, then, the technique is extremely confusing to plan administrators, would be confusing to plan participants, and probably would not be approved until new integration regulations are promulgated (and let us not hold our collective breath on *that* issue). In short, the proposal has little to offer compared with currently used techniques.

The paper offers no solutions to the underlying problems inherent in the use of *any* simulation system, whether it be the one proposed or one of the more viable (for those to whom it is available) alternatives. These problems are the following:

1. *Incomplete and/or broken salary histories*

This could easily be a problem for a plan integrated to the hilt. Most offset plans are not, however. For example, a common offset is 2 percent of the projected social security benefit (assuming no future earnings) for each of the first twenty-five years of service, even though the maximum permissible offset may be $83\frac{1}{3}$ percent, regardless of service (subject to the accrual rules). We believe that this type of offset generally can satisfy the requirements of Revenue Ruling 71-446, even for employees with breaks in service, provided that there is sufficient room between the maximum permitted offset percentage and the plan's offset percentage.

The following is a demonstration of such satisfaction of the requirements. Consider an offset under the following conditions (which, except for the last, we will subsequently remove):

a) Employee has no wages after calendar year of attaining age 60 (i.e., employee retires prior to age 60).
b) Employee was born after 1928 (so that AIME is based on thirty-five years).
c) Employee always earns less than maximum taxable wages.
d) Employee works each of the last three calendar years before retirement.
e) Employee's pay has progressed at the national average rate.

If we now consider an employee who retires after twenty-five years of service and who has never worked elsewhere, and if the plan computes the offset assuming that this employee had covered earnings for a full thirty-five years in the averaging period, the following table can be readily constructed:

1978 Earnings	Ratio of Actual Social Security Benefit to Plan's Estimate
\$1–\$2,328 (lower "bend point")	71.4%
\$2,329–\$3,259 (35/25 × \$2,328)	71.4% up to 87.6%
\$3,260–\$14,052* (upper "bend point")	87.6% down to 78.0%
\$14,053–\$19,673 (35/25 × \$14,052)	78.0% up to 87.4%
\$19,674–\$29,700	87.4% down to 84.4%

* Actual figure slightly lower owing to wage bases prior to 1978.

If we assume that no employees earn less than about \$2,700 (in 1978 dollars), the above table demonstrates that the worst-case situation is that the employee's actual social security benefit is 78 percent of the amount used by the plan in determining benefits. But as long as the maximum permissible offset is at least 64.1 percent, the use of the estimated amount would not result in the actual offset exceeding the maximum permissible one.

Had this employee worked fewer than twenty-five years, the plan's offset would have been proportionately smaller, and it can be demonstrated that the employee's actual social security benefit would not have been more than proportionately smaller. Hence, were a table constructed along the above lines, higher percentages would be shown throughout.

If the employee retires after age 60, the earnings after age 60 carry somewhat greater weight. If, as is usually the case, the break in service occurred before age 60, the difference between actual and estimated social security benefits would be smaller than previously discussed. If the break in service is after age 60, any increase in the difference between actual and estimated social security benefits would be nominal because of the condition we have imposed that the employee works in the last three calendar years preceding retirement.

If the employee was born before 1929, a repetition of the above analysis would reveal a smaller percentage only if some of the employee's years of service (maximum twenty-five) were rendered prior to 1951. Since it would be rare for someone with twenty-five years of service not to have worked twenty-five years after 1951, this condition generally can be dismissed by examining the plan's census data and addressing those few employees if any, who satisfy this condition.

If an individual's benefit is based on the transitional minimum, the worst-case situation is probably that of a high-paid individual who worked the twenty-five years 1951–72 plus 1980–82 but was assumed to have maximum covered earnings for the twenty-seven years 1956–82. In this case, assuming a 1982 limit of $33,000, his actual PIA ($470.10) would be 84 percent of his estimated PIA ($560.60), or far more than the 78 percent threshold. Similar reasoning would demonstrate that the 78 percent threshold is not breached for individuals receiving old-law benefits.

The effect of relatively lower maximums in the past is to lower the threshold percentage below 78 percent, since some years receive greater weight than others. Looking at our pivotal case—an employee earning $14,052 in 1978 and retiring with twenty-five years of service—if we assume that the employee worked the twenty-two years after 1951 with the lowest indexed earnings, and worked three years after 1978, and that the plan would compute a benefit based on his working every year after 1951, but not beyond 1996, we find that this threshold percentage drops from 78 percent to 74.1 percent. Hence the maximum permissible offset would have to be 67.5 percent.

If the employee does not work in all of the three calendar years before retirement, and if the plan determines the offset on the employee's pay rate at retirement, threshold percentages below 74.1 percent are possible. Should offsets exceed the permitted maximum, this situation could be corrected by modifying the offset calculation for employees not satisfying the three-year condition.

2. *Salary increases at a faster rate than assumed in the simulation*

   As stated, this applies as a problem only to those who are not fully covered (i.e., whose earnings do not exceed the wage base).

3. *Indexing of prior wages for employees terminating before age 62*

   Should prior wages for those employees who terminate before age 62 be indexed to two years prior to date of termination as suggested in the paper, or up to the most recent date available (which could be only one year prior to termination for computations done in November and December)? Despite the fact that offset plans are theoretically designed to offset the employee's actual benefit as closely as possible (within the limits of the law), we believe the two-year approach is more consistent with the computation for employees over age 61.

4. *Recognition of service after age 65*

   If an employee works beyond age 65 (which more will do in light of the recent ADEA amendments) and the plan formula recognizes pay and/or service after age 65, the problem arises of the extent to which this should be done with respect to (*a*) recomputation (which increases PIA benefits owing to replacement of a generally lower prior wage with a more recent, generally higher, wage), (*b*) CPI increases (which create a problem even at or before age 65—i.e., should a person retiring at age 64 in May have a smaller offset than a person with the identical pay history who retires in June?), and (*c*) the deferred retirement credit of 3 percent simple interest per year (1 percent, if year of birth is prior to 1917), since there is a real question as to whether or not these increases in social security benefits should be recognized by a plan that does/does not have automatic cost-of-living provisions. This is an extremely fertile area for discussions with the party responsible for interpreting the plan.

As previously stated, the computer model simulation of earnings histories for PIA where actual histories are not used (and this is the recommended approach for all but small companies) could easily be the future basis for the industry, and we may see more companies using the approach wherein only pay "with the company" is used in determining the offset. In such cases, where the decision has been made to simulate PIA and state the offset as an "estimated" amount, problem 1 above disappears, while problems 2, 3, and 4 can be plugged right into the simulation itself.

STEPHEN A. GAGEL:

Mr. Friend and Ms. Pacelli have made a good presentation in their article. The administrative complexity of obtaining an earnings history from the Social Security Administration and difficulty in performing actual social security calculations are reason enough to consider a PIA

simulation procedure. In addition to these reasons, I feel that the question of equity among participants is also a consideration.

An offset plan is attractive, since it makes it relatively easy to design a plan providing specified levels of benefits to career employees and to integrate dynamically with social security. However, there are situations where two individuals with the same final average salary can have significantly different prior work histories—one less than full time in the past, one always full time. If an exact social security calculation is used, the first employee gets a larger retirement plan benefit for a smaller contribution to the company over the years. The use of a PIA simulation procedure can correct this seeming contradiction.

A PIA simulation procedure also gets around the problem of penalizing a moonlighting employee by using his supplemental outside earnings to increase his offset and thereby decrease his retirement plan benefit. The simulation procedure uses only employer earnings and removes the penalty to the moonlighter, so that employees of equal earnings, and equal value to the employer, receive equal benefits.

The conclusion I draw is that a PIA simulation procedure, whether it be the one outlined in this article or any other of a variety of possibilities, is a consulting tool that provides added flexibility in meeting an individual client's particular needs.

(AUTHORS' REVIEW OF DISCUSSION)

EDWARD H. FRIEND AND JANE D. PACELLI:

We wish to thank Messrs. Gross, Siegler, and Gagel for their discussions of the simulation presented in our paper as well as for their comments on PIA simulations in general.

Mr. Gross describes two simulation methods used by his company. His method 1 develops the PIA based on zero past and future earnings. An advantage of this method is that it clearly satisfies the zero-future-earnings method of computing early retirement offsets under Revenue Ruling 71-446. By using zero earnings *before* employment with the employer as well as after, this method eliminates the problem described in Section V, A, of our paper.

Despite the several desirable characteristics of method 1, we would not usually recommend its use. If the plan offset is obtained by prorating the method 1 PIA, it is too small because the zero past and future earnings are, in effect, a second proration. If the PIA is not prorated, it produces an offset that may be considered too large because the regressive

PIA formula produces a more than proportional benefit for a partial career of earnings.

An interesting variation of this method is to develop a "full career AIME" based on indexed earnings with the employer, *divided by twelve times the number of years of indexed earnings included* (not greater than twelve times the social security n). In other words, if the employee worked for fifteen years, the AIME would be based on the sum of indexed earnings with the employer, divided by (12×15) instead of $(12 \times n)$. The PIA based on the "full career AIME" would then be prorated for less than n, or thirty-five or forty, years of service. This method generally should produce a lower offset than method 1, but an integration demonstration is more difficult.

Method 2 (which is the "endpoint" method) would seem to be a satisfactory approximation as long as the employee has had a rather regular career. An employee who starts at a low clerical level and rises to an executive level is either "advantaged" or "disadvantaged," depending on the point at which he rises into the higher "track."

In response to Mr. Siegler's comments, we note the following points:

1. Our simulation method was originally discussed in connection with a large governmental plan that did have computer capability for calculation but did not have back-pay records in computer-accessible form. Obtaining social security earnings was rejected as too time-consuming and costly. The FAS for AIME simulation was prepared as an alternative to a back-pay simulation working from final pay. It would provide a calculation formula that, while not as simple as a typical breakpoint plan, could be worked out by hand or verified by a participant more easily than one based on an artificial pay history.
2. We agree that, for plans with normal retirement age greater than 62, the number of required formulas becomes cumbersome. However, we feel that one or two formulas are quite workable for plans with normal retirement at 62. Updating the bend points each year causes no greater disclosure problems than exist now under breakpoint plans.
3. We agree that using simplifications such as the "2 percent per year" formula adjustment and ignoring the transitional guarantee may result in the employer's not taking as much credit in the social security offset as possible. There is a trade-off between accuracy (and lower benefit costs) and ease of calculation (and lower administrative costs).

Mr. Siegler also discusses general problems relating to any type of social security simulation, and proposes some solutions.

1. As can be seen from his lengthy demonstration, the problem of incomplete or broken salary histories is not trivial. While for certain plans and em-

ployee groups it will be possible to show that integration rules are satisfied, such a demonstration will not be possible in all cases. In our experience, it is not uncommon for an offset plan to have an integration limit of 60 percent or less. For cases such as these, his demonstration falls apart.

2. An actual rate of increase in salaries higher than that used in the simulation is *not* a minor problem, particularly because most wages will be less than the maximum taxable earnings base in the future. A simulation salary scale with a slope that is too slight will diminish most participants' benefits inappropriately through the development of offsets that are too high. It probably is necessary to base a back-pay simulation on a higher rate of salary increase than the earnings index because we would expect salary increases for individuals to exceed those reflected in increases in national average wages. Again, however, there is the potential of going too far and not generating enough credit for the employer.
3. For terminations prior to age 62, we believe there should be no question of indexing wages up to the most recent date available. This is similar to the situation found in a breakpoint plan when the new maximum taxable earnings base is announced prior to the calendar year for which it applies. In this case, Revenue Ruling 78-92 specifically prohibits reflecting the new base prior to the year in which it *takes effect*, irrespective of when it is announced.
4. We agree that offsets for late retirements must be carefully considered in light of other plan provisions. CPI increases should not cause a problem, because the June retiree must not receive a lower plan benefit than if he had retired in May.

We agree with Mr. Gagel that employees with identical earnings and service histories with a company should be treated equally under the pension plan. Use of a simulated PIA can eliminate the penalty to moonlighters, although this could also be accomplished by doing an actual calculation based on employer earnings only.

The second situation he discusses is one in which two employees have identical final average salary and service, but the second employee has higher earnings than the first in all but the final-average years. If the PIA is based on actual earnings, the second employee, who is asserted to have contributed more to the company, receives a smaller pension than the first employee. While this appears to be unfair, it should be noted that, if the plan provides for an offset equal to 50 percent of PIA, the *employer-paid* benefits (plan benefits plus one-half of social security) are *equal*.

The use of final average salary to simulate average indexed monthly earnings changes this result, making the offset and the pension the same for both employees. Because the employer-financed "add-back" (i.e., one-half of actual PIA) is higher for the second employee, his total em-

ployer-paid benefits are greater. This is an interesting argument for the paper's proposed simulation process. Essentially, Mr. Gagel is saying that the use of final average pay is not a completely accurate criterion for measuring relative employee worth. It therefore is not a good idea to use as an offset an item of "real" value, since doing so would, through the impact of leverage, tend to exacerbate the inaccuracy. It is better, argues Mr. Gagel, to diminish the inaccuracy in the fashion indicated.

A more satisfactory way to deal with inequities caused by transfer from part time to full time may be to prorate service and annualize pay instead of trying to solve the problem through the social security offset.