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WAGE AVERAGING RULES AND THE DISTRIBUTION OF SOCIAL SECURITY BENEFITS

by

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I. INTRODUCTION

A. The Problem--Unpredictable Replacement Rates

The high rates of inflation of the past few years have made us aware of some serious problems in present procedures for computing social security benefits. In essence, we have discovered that future replacement rates (the ratio of a newly entitled worker's benefit to some measure of his pre-retirement wage level) and the future social security payroll tax rates required to finance these replacement rates are controlled not by the conscious decisions of policymakers but by the vagaries of future economic events.* In order to bring future replacement rates and tax rates under control, we will have to institute several fundamental changes in the benefit computation procedures.**

There are a number of alternative benefit computation procedures which will give us control over future replacement rates. However, each of these alternatives differs from the others in generating its own unique distribution of benefits among retired workers, disabled workers, dependents, and survivors. Thus, in choosing

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* Under present law, replacement rates and tax rates may either rise or fall over time, depending on the relationship between future rates of increase in average wage and price levels. The factors causing this behavior are explained in Lawrence H. Thompson, "An Analysis of the Factors Currently Determining Benefit Level Adjustments in the Social Security Retirement Program," Office of Income Security Policy, Technical Analysis Paper No. 1, September, 1974.

** These changes are discussed in a pamphlet by Robert J. Myers, "The Case for Indexing of Social Security Benefits for Changes in Wage Levels," May, 1975.

the particular benefit computation procedure which will be used to bring replacement rates under policy control, one is also determining how benefits will be distributed among the different types of recipients.

The decisions about the level and distribution of benefits depend ultimately on the value judgments of policymakers. They will have to decide what portion of national income should be devoted to social security benefit payments at any particular time and how these payments should be distributed among beneficiaries with different pre-eligibility earnings levels and patterns. As policymakers address these issues they should find it useful to examine how particular groups of people--men and women, blacks and whites, high income and low income--will fare under alternative benefit computation schemes. This paper reports the results of such an analysis.

B. The Current Benefit Computation Process

Before proceeding it will be useful to review briefly the way in which social security benefits are computed under current law. The first stage in the benefit computation process is the calculation of a person's average monthly wage (AMW). A person's AMW is the average of a certain number of his past wages on which payroll taxes were paid. Under current law, the number of annual wages used to compute this average is equal to the number of years elapsing after 1956 (or age 26, if later) and before the year in which the worker either reaches age 62, dies, or becomes disabled.* This average monthly wage is converted into a primary insurance amount (PIA) by a multi-bracketed formula. Currently, this formula sets a worker's PIA equal to roughly 130 percent of the first $110 of his average monthly wage, 47 percent of the next $290, 44 percent of the next $150 and so on through five additional brackets.**

The conversion of a person's PIA into a monthly benefit amount consists of a multiplication that adjusts the PIA for the age of the wage earner or beneficiary at the time benefits are first drawn and the relationship between the individual drawing benefits and the wage earner. A person retiring at age 65 will receive a monthly benefit equal to 100 percent of his PIA; a person retiring at age 62 will draw a benefit equal to 80 percent of his PIA. In summary, to compute a person's benefit, an average of wages earned is transformed into a primary insurance amount through a benefit formula, and the primary insurance amount is adjusted for the ages of the beneficiary and wage earner and for the relationship of the beneficiary to the wage earner.

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* Technically, this provision applies only to people reaching age 62 after 1975.

** The current PIA formula is 129.48% of the first $110 of average monthly wage, 47.10% of the next $290, 44.01% of the next $150, 57.73% of the next $100, 28.77% of the next $100, 23.98% of the next $250, 21.60% of the next $175, and 20% of the last $100.

C. The Issues to be Examined

This paper examines four of the ways in which social security benefit computation schemes can vary and analyzes how changes in each of these affects the distribution of the benefits due retirees. The first aspect of the benefit computation scheme on which we focus is whether and in what manner wages should be indexed before the AMW calculation is made. The second and third involve the number of years over which wages are to be averaged and the particular years in a worker's wage history which are to be eligible for inclusion in the average. And the fourth is the question of how adjustments for a person's length of service should be introduced into the benefit calculation. This analysis does not consider the effect of variations in the benefit computation procedures on survivor and disability beneficiaries.

II. ANALYZING EARNINGS HISTORIES

When the current social security system matures, a person's average monthly wage will be computed from the highest thirty-five of his annual earnings figures. Currently, the analysis of this and alternative averaging rules is limited by the lack of usable earnings records spanning thirty-five years. To fill this gap we have employed social security earnings records for several age cohorts to produce long earnings histories for a hypothetical cohort of retirees. The techniques used to create this sample are described in Appendix A.

A. Structuring the Present Analysis

The availability of long earnings histories allows us to analyze the effect of alternative benefit computation schemes on people with different types of earnings patterns. There are, however, some problems. No existing data base--including the present one--allows us to relate earnings histories to family size, spouse's earnings, capital income, transfer payments, and the like. We therefore cannot say how a given benefit computation plan will affect people who differ in respects other than their earnings, race, and sex. Work is currently underway to fill this gap. In the meantime we can engage only in the somewhat circular process of showing how various earnings-related benefit formulas treat people with different patterns of earnings.

Since earnings histories can exist in numberless variety, it is convenient to classify these diverse patterns into a small number of categories. We have adopted six measures, three which reflect the level of an individual's earnings and three which indicate the pattern of earnings over his lifetime.* The three measures of earnings level are (1) a measure of permanent wage income at the time of retirement, (2) a measure of relative wages immediately prior to retirement, and (3) a measure of the individual's lifetime annual earnings rate. The three measures of earnings patterns are (1) a measure of gaps, or the number of years prior to retirement in which there were no earnings, (2) a measure of the individual's lifetime trend relative to other members of his cohort, and (3) a measure of year to year variability in earnings.

The particular measures are listed and described in Table 1. Table 2 shows the simple correlation between each of the six measures. As would be expected, the three measures of earnings level are highly correlated, especially permanent earnings and preretirement earnings. Negative correlations between the number of gaps or earnings variability and the various measures of earnings level indicate that people with highly variable or broken earnings patterns are likely to have low average earnings. However, these same individuals do not have consistently positive or negative lifetime earnings trends. Finally, we note that there is no significant

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* Our categories are inspired by those suggested by Herman Grundmann, "A Basic System for Classifying Earnings Patterns," Social Security Administration, Office of Research and Statistics, September 16, 1975.

TABLE 1.--CLASSIFYING EARNINGS HISTORIES

Measure	Description
Friedman Permanent Income	Geometrically declining weighted average of real earnings prior to retirement, with decay coefficient of 0.67.
Lifetime Non-zero Earnings	Mean of all non-zero earnings figures, indexed by economy-wide wages.
Last Ten Pre-Retirement Earnings	Mean of wages in ten years prior to retirement, indexed by economy-wide wages.
Gaps	Number of years with no earnings.
Trend	Coefficient of time in regression $w = a + b(\text{time})$, where w is the ratio of the individual's earnings to the cohort average, and years with no earnings are excluded.
Variability	Standard error not adjusted for degrees of freedom divided by the mean of the regression $w_t = a + b(w_{t-1})$, where w is defined as before, and years with no earnings are again excluded.

TABLE 2.--CORRELATION OF EARNINGS MEASURES
(2137 wage earners)

	Gaps	Friedman Permanent Income	Last Ten Pre-Retirement Earnings	Lifetime Non-zero Earnings	Trend	Variability
Gaps	1.00	-0.56	-0.63	-0.51	-0.06	0.50
Permanent Income		1.00	0.95	0.65	0.44	-0.58
Pre-Retirement Earnings			1.00	0.70	0.44	-0.63
Lifetime Earnings				1.00	-0.06	-0.67
Trend					1.00	-0.15
Variability						1.00

correlation between lifetime earnings trends and average lifetime earnings rates. However, because the permanent and preretirement earnings measures give greater weight to earnings later in life, the trend measure is positively correlated with these earnings level measures.

For the purposes of this analysis we have grouped the wage histories into twenty-four cells. The cells represent four different ranges of values for each of the six measures of wage history characteristics. For each measure, the first bracket includes all people whose earnings history falls more than one standard deviation below the mean when ranked on that particular measure. The second bracket contains those whose earnings history falls between one standard deviation below the mean and the mean. People who fall above the mean by less than one standard deviation are assigned to the third bracket. Those who are more than one standard deviation above the mean are in the fourth bracket.

Thus the lowest brackets include respectively people with no gaps in their earnings, a level of permanent income or pre-retirement earnings below roughly $2,000 per year, lifetime non-zero earnings less than $4,100, a pronounced negative trend, or little variability. The mean number of gaps is 8.5, mean pre-retirement earnings are approximately $6,700 per year, mean lifetime non-zero earnings are about $7,700 per year, and the mean trend is zero. The highest brackets comprise those with seventeen or more years of zero earnings, average earnings above $11,500 per year, a sharp positive trend, or high variability.

Table 3 shows the distribution of individuals within brackets by sex and race. About forty percent of females have seventeen or more years of zero earnings, and over two-thirds of the females are below the mean level of earnings. Most women also have earnings histories with positive trends and little variability. Seventy percent of males have fewer than eight years of zero earnings, and almost sixty percent had earnings above the mean on each of the measures of earnings level. Males are almost evenly divided between those with positive and negative trends in their earnings histories, while sixty-five percent have little or no variability in their earnings. On most measures the contrasts between males and females seem much more marked than the contrasts between blacks and whites, although the majority of both black males and black females have incomes below the mean.

B. Plan of Analysis

To evaluate the distributional impact of alternative benefit computation provisions we have chosen to examine eleven alternative benefit computation plans. These eleven plans, listed in Table 4, have been chosen so that one can determine the effect of changing a single part of the benefit computation, holding all others constant. For instance, plans 1, 2, and 3 are identical except for the manner in wages are indexed prior to computing the AMW. Comparing plan 2 with plan 1 shows the effect of indexing

TABLE 3.--
NUMBER OF CASES IN EACH CELL

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
1295 WHITE MALES						
1	415	236	242	108	182	190
2	481	284	275	323	502	663
3	228	393	379	442	475	301
4	171	382	399	422	136	141
683 WHITE FEMALES						
1	42	203	178	237	56	40
2	172	255	277	292	182	307
3	198	180	186	138	317	197
4	271	45	42	16	128	139
512 BLACK MALES						
1	128	147	174	195	51	20
2	177	180	167	207	174	235
3	108	144	127	70	231	136
4	99	41	44	40	56	121
285 BLACK FEMALES						
1	23	134	142	210	32	7
2	77	124	121	59	74	106
3	72	24	21	16	156	91
4	113	3	1	0	23	81
2775 INSURED WORKERS						
1	608	720	736	750	321	257
2	907	843	840	881	932	1311
3	606	741	713	666	1179	725
4	654	471	486	478	343	482

TABLE 4.--ALTERNATIVE BENEFIT COMPUTATION PLANS

	Indexing	Included Years	Length of Service Adjustment
1.	None	All non-zero*	None
2.	Wage	All non-zero	None
3.	Price	All non-zero	None
4.	Wage	All non-zero	10.0% per year over 10**
5.	Wage	34 of last 39	3.33% per year over 10
6.	Wage	34 of last 39	None
7.	Wage	10 of last 15	10.0% per year over 10
8.	Wage	19 of last 24	None
9.	Wage	19 of last 39	None
10.	None	19 of last 39	None
11.	None	19 of last 24	None

* All years in which a person has any covered earnings.

** Benefits are increased by 10.0 percent of the formula amount for each year in excess of ten in which a person's covered earnings equal or exceed five percent of mean covered earnings for all workers.

earnings by economy-wide wages instead of using unindexed earnings, with all years of non-zero earnings in the average.

The analysis of the effect of the various plans was undertaken in the following manner. First, we computed the actual mean and standard deviation of the AMWs of the individual wage histories falling in each bracket of each earnings history measure. Then, in order to facilitate comparisons, we standardized the AMWs produced under each computational plan. These standardized AMSs represent the AMW that is produced when all AMWs for a given plan are multiplied by the factor necessary to make the average AMW for the entire sample equal the average AMW computed using the procedures now in effect.* The numbers shown are intended to represent the AMW and PIA values that would be assigned persons retiring during 1975. The detailed results of these computations are shown in the tables of Appendix B.

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* The alternative PIA formulas each have two brackets, with the division between the brackets set at the same point in the AMW distribution as in present law. The benefit conversion rates in each bracket were chosen so that the would be in the same ratio and so that a person with the mean AMW would have the same PIA as under current law. The benefit conversion rates were then adjusted proportionately to equate the mean PIA in all plans. There is no minimum benefit provision in these computations.

III. INDEXING EARNINGS RECORDS

A. Rationale for Indexing

Social security is an earnings replacement program. OASDI benefits are designed to replace a portion of a worker's earnings lost through retirement, disablement, or death and thereby to cushion the decline in his family's standard of living. Because each individual's earnings vary from year to year, any benefit computation scheme will probably measure pre-retirement or pre-disablement wages by some average of the person's earnings over a number of years. However, in a dynamic economy, with continuing changes in prices and productivity, it is difficult to compare meaningfully the dollars earned in one year with those earned in other years. A simple, unindexed average of the dollars earned, especially if many years' wages are included, will have little relationship to a person's standard of living prior to retirement or disablement.

1. Principal Indexes: Prices and Wages.--Two types of indexes have been most frequently suggested for computing an individual's average wage--an index of consumer prices and an index of wage levels in the economy at large. Indexing by prices expresses each prior year's wage in terms of the quantity of goods and services it could now purchase. For example, because consumer prices have roughly doubled since 1956, a dollar bought twice as many goods and services in 1956 as it does today. A social security taxable wage of $4,000 earned in 1956 would buy $8,000 worth of goods and

services measured in 1975 dollars. Therefore, under price indexing, the 1956 wage of $4,000 would be adjusted before computing the AMW so that it was the equivalent of a taxable wage of $8,000 earned in 1975.

Indexing by wages expresses each prior year's wage in terms of what that wage would be if the worker were employed in a similar job today. For example, since 1956 the typical individual's wage has increased by about 150 percent. Thus, on average, a job that paid $4,000 in 1956 would pay $10,000 today. Under wage indexing, therefore, a taxable wage of $4,000 in 1956 would be deemed equivalent for AMW computational purposes to a 1975 taxable wage of $10,000.

2. Philosophical Underpinnings of the Alternative Indexes.--There are two major perspectives from which one can compare price indexing and wage indexing of earnings records. One involves the philosophical principles underlying the social security system; the other is the pragmatic concern of which individuals gain the most under alternative benefit computation schemes.

First, the choice of an index is related to the issue of what earnings social security benefits are designed to replace. The earnings replacement objective of social security is to moderate the decline in living standards when an individual's earnings cease because of retirement, disability, or death. But how is that pre-eligibility standard of living to be measured?

Are the taxable earnings to be measured in terms of the command over goods and services that they gave the worker--price indexing? Or are they to be measured in terms of the position which they gave the worker relative to other wage earners--wage indexing? Roughly speaking, price indexing replaces a standard of living that is measured in absolute terms, while wage indexing replaces a standard of living measured in relative terms.

B. Effect on People with Different Earnings Histories

The second perspective from which to evaluate the choice of an index is to examine how different groups of earners are affected. Assuming that the total amount of benefits has been determined, how do the shares of benefits received by various types of people vary with the indexing scheme selected?

1. Earnings Trends.--Because prices and average wages generally rise over time, either form of indexing will increase the portion of social security benefits going to those whose relative earnings decline over their lifetimes. This category will include those who enter the labor force at a relatively young age and who do not take out a number of years after high school to acquire additional training or education. It will include blue-collar workers, whose earnings rise relatively slowly during their working lives and reach their peak several years before retirement. It will also include women who begin work relatively early and

postpone taking time out from work to have children as long as possible. And it will include people who, for whatever reason, decide to retire at a relatively young age. Since average wages generally rise more rapidly than prices, people with negative earnings trends will benefit even more from wage indexing than from price indexing. Conversely, not indexing earnings records, the procedure used under current law, benefits most those whose highest earnings are later in life--people with extensive formal education, white-collar workers, women who have children when they are young and then enter or reenter the labor force, and those who postpone retirement.

The effect of indexing on people with different earnings trends appears clearly in comparing plans 1, 2, and 3, where all years of non-zero earnings are included in the wage average and all years of zero earnings are excluded. Workers with a sharply negative trend (more than one standard deviation below the mean) have an average standardized AMW of $239 when earnings are not indexed (plan 1), $299 when earnings are indexed by prices (plan 3), and $363 when earnings are indexed by average wages (plan 2). At the other extreme, those with large positive trends (more than one standard deviation above the mean) have an average standardized AMW of $338 with wage indexing, $386 with price indexing, and $432 with no indexing. Thus, for people whose earnings are declining most rapidly relative to other members of their cohort, the average monthly wage is about 25 percent greater with price indexing and 50 percent greater with wage indexing than with no indexing at all. And, for people whose earnings are rising most rapidly, the mean AMW is 22 percent smaller under wage indexing and 11 percent lower under price indexing than it is without any indexing.

A bare majority of males have negative trends in their earnings histories. Thus the mean standardized AMW for males will rise slightly when earnings are indexed by a price or wage index. If all years of non-zero earnings are included in the average, the mean male PIA is about 2 percent higher with wage indexing (plan 2) than with no indexing (plan 1). Two-thirds of the women in our sample have positive trends, which means that they will generally have higher AMWs when earnings are not indexed than when either a price index or wage index is used. A comparison of plans 1 and 2 shows that the introduction of wage indexing reduces the mean PIA of insured women by about 5 percent.

Our results suggest that wage indexing eliminates the effect of the trend in a person's earnings on his average monthly wage and benefit. With no indexing (plan 1) those with the largest positive trend will have an average AMW about 80 percent larger than those with the most negative trends. With price indexing (plan 3) the difference is only about 29 percent, while wage indexing (plan 2) actually gives those with the most negative trends an average AMW that is 7 percent higher.

2. Earnings Levels.--The direct effect of indexing or not indexing earnings is its impact on average AMWs and PIAs of workers with different lifetime earnings trends. However, to the extent that other attributes of wage histories are correlated with the trend, indexing also affects the mean AMWs of workers arrayed by their standing with respect to other attributes.

In our sample, the two measures of earnings level which consider only earnings immediately preceding retirement have a correlation of about 0.44 with trend. This means that there is a tendency for those whose preretirement earnings are low also to have a negative trend. Indexing, which helps those people with a negative trend, therefore also tends to help people with low preretirement earnings or low permanent income. The third earnings measure, lifetime non-zero earnings, has little correlation with earnings trends. Consequently indexing has little effect on relative AMWs when people are grouped according to lifetime earnings.

IV. ELIGIBLE YEARS AND DROP-OUT YEARS

The three rules involved in specifying the AMW computational step are whether and how to index, how many annual earnings figures to average in computing the AMW, and which of annual earnings figures are to be eligible for inclusion in the AMW computation. While the previous section looked at the first of these rules, this section focuses on the second and third.

The number of years that must be included in each individual's AMW calculation (the averaging period) can be as few as one or as many as fifty. The number need not be the same for all workers. The averaging period might be allowed to vary according to the reason for entitlement, or the individual's age at entitlement, or the individual's pattern of past participation in covered employment.

The number of years that are eligible for inclusion in the AMW calculation can be equal to or greater than the number of included years. If the number of eligible years is greater than the number of included years, the difference represents the number of years of low or zero earnings which can be left out of the AMW calculation. This is the number of drop-out years allowed the beneficiary.

The choice of the rules determining the years which are eligible and the number which must be included will depend on the philosophy of the policymaker and his balancing of philosophical and practical considerations. The next section examines two philosophical viewpoints which the policymaker might adopt, and the following section illustrates their practical implications.

A. Philosophical Principles

1. Wage Replacement View.--The wage replacement rationale for social security cash benefits is that they are designed to offset the earnings that are lost as a direct result of a worker's retirement, disablement, or death. To the extent that one accepts this rationale, one may wish to construct the AMW so that it reflects the amount of earnings that are actually lost as a result of the event causing entitlement. This implies that one would restrict the years which are eligible for inclusion in the AMW to those immediately preceding entitlement, on the assumption that the average level of wages earned more than ten or fifteen years earlier is a poor indicator of the wage loss resulting from death, disability, or retirement.*

2. Lifetime Earnings View.--The second view of social security might be called the lifetime earnings rationale. According to this view, the purpose of social security cash benefits is to provide income at the time of retirement, disablement, or death to all persons who ever worked the requisite number of quarters in covered employment, and to their dependents.

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* At the present time we pay benefits to a number of retired workers with little covered employment in the years immediately preceding the date of entitlement. These people consist both of those who were not working at all prior to retirement and those who were working in employment not covered by social security. Approximately 7 percent of newly entitled male retirees and 21 percent of female retirees have three or fewer years of covered earnings in the ten years immediately preceding entitlement.

Acceptance of this rationale implies that the effect on earnings of the event causing entitlement is not a relevant consideration.

If one holds the view that any person who worked the required period of time is entitled to benefits, the implication is that any taxable wage the individual ever earned should be eligible for inclusion in the AMW. This viewpoint does not imply anything about the number of years to be included in either the eligible period or the averaging period; it implies only that no year should be excluded. The averaging period might be as short as two or three years or as long as forty-five or more years, depending on the policymaker's judgment about what length of time will give the best measure of a worker's average wage.

B. Effect on People with Different Earnings Histories

1. Varying the Eligible Years.--The effect of varying the number of eligible years while holding the number of included years constant can be seen by comparing a plan in which all years are eligible for inclusion in the AMW computation to a plan in which only the 24 years immediately preceding retirement are eligible. Two such plans, each of which employs a wage indexed AMW computed using the highest 19 years of earnings, are plan 9, where all 39 years are eligible, and plan 8, where only the last 24 years are eligible. By restricting the eligible years to the 24 years immediately preceding retirement, plan 8 reproduces the rule on eligible years which is currently in effect for 1975 retirees. Plan 9 shows the rule which, under current law, will apply to persons retiring in 1990.

Restricting the eligible years to those immediately prior to retirement can be expected to reduce the AMWs of those workers for whom earnings in the immediate preretirement years are relatively lower than earnings in other parts of their earnings histories. Our results suggest that, in addition to those having negative trends, these workers tend to be workers with broken or fluctuating wage histories.

As one might expect, persons having a negative lifetime earnings trend or highly variable earnings have much higher mean AMWs when all years are eligible for inclusion in the averaging calculation. In the 19 of 39 plan the mean AMW for those having the most negative trends is about double the mean AMW when only the last 24 years are eligible. For those wage histories which showed the greatest variability, the mean AMW is 50 percent greater with 39 years eligible than when only the last 24 years were eligible.

For workers with more than the average number of gaps (years of zero earnings) in their wage histories, the mean AMWs using the last 24 years are considerably lower than when all 39 years are eligible to be included in the wage average. Among those with 9 to 16 zero years, the mean standardized AMW is $235 when only the most recent 24 years are eligible for inclusion. It is $300, or 28 percent more, when all 39 years are eligible for inclusion. Among those with 17 or more years of zero earnings the mean AMW with 24 eligible years is $111, whereas with 39 eligible years it is $164, an increase of almost 50 percent.

As was noted previously, wage history trends are negatively correlated with preretirement and permanent earnings, the two earnings level measures which focus only on earnings levels late in a person's life. Moreover, gaps, the number of years with zero earnings, are negatively correlated with all three of the earnings level measures. Thus it is not surprising that the effect of restricting the eligible years on people with low earnings is similar to the effect on people with negative trends or many gaps. The mean standardized AMW of people in the lowest preretirement and permanent income brackets is roughly twice as high when all 39 years are eligible as it is when only the last 24 years are eligible. For those in the lowest bracket on the lifetime earnings measure, the standardized AMW increases by about 15 percent when the number of eligible years is increased.

When workers are arrayed by race and sex, expansion of the number of eligible years from 24 to 39 appears to have little effect. The group most affected by such a change is black males, who experience an increase of about 4 percent in their AMWs and 7 percent in their PIAs. White women as a group experience a slight drop in their mean AMW when the eligible years are expanded, but this does not affect their mean PIA.

The effect of varying the number of eligible years while holding the number of drop-out years constant may be seen by comparing plans 6 and 8. Both plans 6 and 8 use wage-indexed earnings records and allow five drop-out years, but the former includes 34 years of earnings in computing the AMW while the latter includes only 19 years. As in the previous comparison, varying the number of included years has its most notable effect on people with differing trends in their earnings. The group of people with the most pronounced negative trends has a standardized AMW which is 70 percent higher when 39 years are eligible than when only 24 years are eligible. Conversely, those with the greatest positive trends have a standardized AMW which is 30 percent higher when 24 rather than 39 years are eligible.

In contrast to the previous comparison, however, changing the number of eligible years while not changing the number of drop-out years has little effect on people with differing numbers of gaps or amount of variability in their earnings histories. This indicates that the differential effect on people with differing gaps and variability noted above was due to varying the number of drop-out years and not due to changes in the number of eligible years. The primary effect of changing the number of eligible years <u>per se</u> is on people with different earnings trends. Those with negative trends have the highest mean AMWs when all years are eligible for inclusion, while those with positive trends have higher AMWs when eligible years are restricted to some number immediately preceding retirement.

2. <u>Varying the Number of Drop-Out Years</u>.--Any year which is available for use in the AMW computation must end up either as an included year or a drop-out year. Thus, given a particular rule determining the eligible years, the rule determining the averaging period can be viewed either in terms of how many years are included in the averaging period or in terms of how many drop-out years are allowed. In this analysis we have chosen the indirect approach of addressing the effect of varying the number of drop-out years.

In order to isolate the effect of changes in the number of drop-out years we have constructed three plans which hold eligible years constant at 39 years and vary the number of drop-out years. These are plan 2 (all nonzero years included), plan 6 (high 34), and plan 9 (high 19). Each employs wage indexing. A comparison of the AMWs computed under these three plans shows that persons with the greatest irregularity in their work histories, as measured by both the gaps and variability characteristics, had their highest mean AMWs when all zero years were dropped. Conversely, for persons with very regular earnings histories the highest AMWs were produced by the plan which drops out only 5 years. For those with the most earnings gaps, the mean AMW is $119 with 5 drop-out years (plan 6), $164 with 20 drop-out years (plan 9), and $224 with all zero years excluded (plan 2). For those workers with the greatest earnings variability, the mean AMW is $110 with 5 drop-out years, $145 with 20 drop-out years, and $163 when all years of zero earnings are dropped. Increasing the number of drop-out years reduces the AMWs of those with few gaps and little variation. The average AMW of workers having no gaps falls from $536 to $462 and the average AMW of workers having the least earnings variation falls from $561 to $477 as the number of drop-out years is increased from five to twenty.

Among white workers varying the number of drop-out years has a significant impact on the relationship between the mean male AMW and the mean female AMW. Increasing the number of drop-out years from five to twenty causes the male mean to fall by 4 percent (from $419 to $403), while it causes the female mean to rise by 14 percent (from $199 to $227). A shift from 20 drop-out years to the dropping of all years with zero earnings causes another 9 percent drop (to $366) in the mean AMW of white males and produces another 6 percent increase (to $240) in the mean AMW of white females.

Among black workers the changes produced by varying the number of drop-out years are less dramatic, and the pattern is more complex. The black male mean rises from $244 to $252 if drop-out years are increased from five to twenty, but it falls back to $242 if all zero earnings are dropped. On the other hand, increasing the number of drop-out years from five to twenty produces a slight decline the the mean AMW of black females, while changing the number of drop-out years from twenty to all years of zero earnings causes an 8 percent increase.

A comparison of plans 8 and 9 shows the effect of varying the number of drop-out years when the number of included years (rather than the number of eligible years) is held constant. Both plans use 19 years of earnings in computing the AMW, but plan 8 allows five drop-out years, while plan 9 has twenty drop-out years. This same comparison was made when we were examining the effect of changing the number of eligible years As we noted there, increasing the number of drop-out or eligible years, holding included years constant, aids those with highly variable earnings, many earnings gaps, or negative lifetime earnings trends. Except for the impact on people with different earnings trends, these are the same results we found in varying the number of drop-out years, holding the number of eligible years constant. We may therefore conclude that the effect of varying the number of drop-out years by itself is to alter the distribution of social security benefits among people with differing degrees of variability or brokenness in their earnings.

3. Wage Replacement versus Lifetime Earnings.--In the two preceding sections we examined the distribution of AMWs when a particular computation rule was changed and other factors were held constant. Here we select a single plan to represent each of the two philosophical rationales for social security and examine the distribution of AMWs under each plan. If one accepts the wage replacement rationale--that cash benefits are designed to replace the earnings lost as a direct result of a worker's retirement,

disablement, or death--one might wish to restrict the eligible years to those immediately preceding entitlement. According to the lifetime earnings rationale--that social security cash benefits should provide income at the time of entitlement to all insured workers--no taxable wage the individual ever earned should be excluded from the wage average.

The wage replacement rationale is exemplified by the wage indexed, 10 of last 15 plan (plan 7). The lifetime earnings replacement rationale is represented by the wage indexed, all non-zero plan (plan 4). Both plans make the same explicit adjustment for length of service. The plan reflecting the lifetime earnings view (plan 4) results in higher mean PIAs for those with six or more years without covered earnings. It also produces higher mean PIAs for those with earnings below the mean, a negative trend in their wage, or with variability greater than the mean. The plan reflecting the wage replacement view (plan 7) results in higher mean PIAs for those with fewer than nine years without covered earnings and for those with preretirement earnings above the mean. In addition, it produces higher mean PIAs for those with positive wage trends and little variability. The distribution of benefits between men and women, however, is essentially the same under the two plans.

V. ACCOUNTING FOR LENGTH OF SERVICE

A. Alternative Approaches

It is generally accepted that a person should receive higher social security benefits the more time he or she spends in covered employment. This goal may be achieved either explicitly by increasing a person's replacement rate for additional employment or implicitly, for example, by measuring the wages to be replaced over a long averaging period. These two alternatives would be substantially identical if replacement rates were the same at all average monthly wage levels, but differ significantly if persons with low earnings have a larger fraction of their earnings replaced than persons with high earnings. In the latter case choosing between the two alternatives amounts to deciding precisely whom the weighted benefit formula is designed to help.

Averaging wages over the entire number of possible working years provides an implicit adjustment for differing lengths of service in covered employment. Of two workers with the same earning potential, the one who works for more years will have a higher average monthly wage and a higher retirement benefit. If Worker A works at the same wage rate as Worker B except that he works for twice as many years, Worker A's AMW will be roughly twice as high as that of Worker B. Plan 6, in which 34 out of 39 years are included in the wage average, implicitly adjusts for length of service by requiring the use of 34 annual wage figures even if the worker does not have 34 years of earnings.

Two features characterize any plan with an implicit length of service adjustment. First, the resulting adjustment does not make PIAs proportional to length of service. Because of the weighting in the benefit formula, Worker A (in the above example) will have a primary insurance amount that is less than twice the PIA of Worker B, even though A's AMW is twice B's. Second, the implicit adjustment does not distinguish between a person with a low wage rate and many years of covered employment and a person with a high wage rate and few years of covered earnings. In either case the workers would have a low AMW, and two people with the same AMW--irrespective of their wage rates when working--will always receive the same benefit.

Plan 4 makes the length of service adjustment completely explicit. In that plan years with no earnings are not included in the average monthly wage calculation. Thus the AMW measures a person's earnings in those years in which he has earnings but does not depend on the number of years with no earnings. For those with only ten years of covered earnings (the minimum necessary to be entitled to retirement benefits when the present system is mature), the retirement benefit equals the formula amount. Benefits are increased by 10.0 percent of the formula amount for each year in excess of ten in which the person's covered earnings equal or exceed five percent of mean covered earnings for all workers. Thus, with an explicit length of service adjustment two workers with the same AMW and differing lengths of service will receive benefits that are proportional to their length of service. In the above example, Worker A's benefit would be exactly twice that of Worker B. The explicit adjustment also allows the system to distinguish between people with low wage rates and those with limited service in covered employment.

Plan 5 combines the implicit and explicit adjustments. The average wage included 34 years, but explicit credit is also given for years of service in excess of the minimum. Since this plan retains an implicit length of service adjustment, the explicit length of service adjustment is less powerful than in plan 4, where the length of service credit was entirely explicit. Benefits are increased by 3.33 percent of the formula amount for each year of service beyond ten.

B. Implications of the Alternatives

Plans 4 and 5, the two plans with an explicit length of service adjustment, produce essentially identical results. For each group within each earnings history measure, the PIAs are almost the same under the two plans. In no group do the average PIAs differ by more than 9 percent, and in most instances they differ by 5 percent or less. The two plans doubtless differ in their treatment of specific individuals, but they can not be distinguished in the overall impact. Thus, if it is thought desirable to treat length of service explicitly in the benefit calculation, it does not seem necessary to depart from the long averaging period towards which the present law is moving.

By construction plan 4, the plan with only an explicit length of service adjustment, and plan 6, the plan with only an implicit adjustment, differ primarily in their treatment of people with varying numbers of years of zero earnings. For those with no gaps the average PIA is 10 percent higher with an explicit adjustment, while for those with one to eight gaps it is 4 percent higher. However, the explicit length of service adjustment produces a benefit 10 percent lower for those with nine to sixteen gaps and 24 percent lower for those with seventeen or more years without earnings.

The two plans differ less significantly in their treatment of people with different earnings levels. Because of the negative correlation between earnings gaps and lifetime non-zero earnings, the explicit length of service adjustment increases by 5 percent the average benefit of those with lifetime earnings levels more than one standard deviation above the mean and reduces by 14 percent the average PIA of those with lifetime earnings more than one standard deviation below the mean. Within each lifetime earnings bracket, of course, the explicit length of service adjustment increases the retirement benefit of those with years of service above the average.

Females, on average, would have PIAs about 8 percent lower with the explicit length of service adjustment (plan 4) than with the implicit adjustment (plan 6), because over two-thirds of all women have nine or more years without earnings. Black males are, as a group, unaffected by the method of accounting for length of service, but white males have an average PIA 3 percent higher with the fully explicit adjustment than with the implicit adjustment alone, since they tend to have relatively few gaps.

VI. CONCLUSIONS

In this paper we have explored the effect of varying four different benefit computation rules--the indexing of wage histories prior to computing the AMW, the determination of eligible years, the determination of the drop-out years, and the method of adjusting for length of service.

The major effect of indexing wage histories is a redistribution among workers having different lifetime earnings trends, a result which should conform to one's expectation. As compared to no indexing at all, the introduction of wage indexing causes a 50 percent increase in the standardized AMW of the persons having the most negative trends, a group which constitutes about one-eighth of our sample. At the same time the introduction of wage indexing causes a 22 percent decline in the standardized AMW of the workers having the most positive trends, another eighth of the sample. The rankings of workers by the two earnings categories which focus on earnings late in life are, partly by construction, positively correlated with the rankings of workers by trend. Therefore indexing causes an increase in the mean standardized AMW of workers who have low earnings levels according to these two measures.

Changes in the number of eligible years also primarily affect workers who have different earnings trends. For workers having the most negative trends, expansion of eligible years from twenty-four to thirty-nine in a wage indexed system has a more powerful effect than wage indexing had. It causes the mean standardized AMW to double. Such an expansion in eligible years causes less dramatic declines in the AMWs of those with positive earnings trends.

Increasing the number of drop-out years helps those workers with variable or broken earnings histories. The mean AMW of workers having the largest number of years with zero earnings rises by 37 percent and the mean AMW of workers having the most variable earnings rises by 31 percent as the number of drop-out years is increased from five to twenty.

Finally, our analysis suggests that the effect of making the current implicit length of service adjustment fully explicit would be to redistribute benefits from workers with a large number of gaps to workers with no gaps. The mean primary insurance amount of workers with 17 or more years of zero earnings would fall by 24 percent and that of workers with no zero years would rise by 10 percent if the adjustment for length of service were to be made entirely explicit. Since workers with the lowest lifetime earnings trend also tend to have more than the average number of gaps, a fully explicit length of service adjustment would reduce their mean PIA by about 15 percent.

The white women in our sample are more likely to have a positive earnings trend than are the white men. Consequently the mean standardized AMW of these women falls somewhat when wage or price indexing is introduced. For the same reason, the mean white female AMW again falls when the number of eligible years is expanded. As compared to the white men in our sample, the white women have significantly more gaps. Therefore an increase in the number of drop-out years will increase their standardized AMW. As it turns out, for both men and women the effect of increasing the drop-out years just cancels the effect of increasing the eligible years if the two are increased equally. Thus, taken as a group, white men and women do equally well selecting the high 19 of the previous 39 years or selecting the high 19 of the previous 24. Finally, because of the greater number of zero years in the records of white women, they lose relative to men if the length of service adjustment is made entirely explicit. With one exception black males and black females are affected in roughly the same manner as their white counterparts by variations in the benefit computation rules. The exception is that neither changing the drop-out nor eligible years has much of an impact on the AMWs of black females.

APPENDIX A

CREATING AND ANALYZING EARNINGS HISTORIES

A. Creating the Sample

In the past it has not been possible to undertake an analysis of the distribution of social security benefits among various groups because of the absence of a suitable data base. Even though the social security program is almost forty years old, most of the earnings data available for analysis are limited to the years since 1950, when the fraction of total employment covered by the social security system was expanded. Moreover, even the available post-1950 data are not representative of the earnings patterns of future retirees. Year to year changes in the wage base--the ceiling on the level of earnings that is subject to social security taxation, used in computing social security benefits, and recorded in most social security data bases--were irregular and unpredictable prior to 1974. Thus, for persons with above average earnings, records showing past patterns of taxable earnings will not accurately represent future yearly earnings totals.

We have employed social security earnings records for several age cohorts from 1957 through 1971 to produce long earnings histories for a hypothetical cohort of retirees. The wage data for the 1957-1971 period were taken from the Social Security Administration's Longitudinal Employee-Employer Data (LEED) file.

This file contains estimates of each worker's total annual wages, including those above the taxable maximum. The LEED file was combined with SSA's Annual Self-Employed file to obtain total earnings (wages and self-employment income) for members of the sample.* The combined file includes information on the age, race, sex, and employers of people in the sample.**

From the combined LEED-SE file we first extracted the records of people who were 65-years old and people who were 57-years old in 1971. Each member of the older cohort was matched with a similar person from the younger cohort according to procedures detailed below. Merging the earnings records of these two cohorts creates a hypothetical earnings history spanning ages 49 to 65, where the earnings records for ages 49 to 56 are those for the younger person in the match and the records for ages 57 to 65 are those for the older individual. The further matching of earnings records for persons who were 49-years old and persons who were 41-years old in 1971 produces an earnings history for ages 27 through 65, a thirty-nine year period. The process is illustrated in Figure 1.

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* All-zero earnings histories were created to represent 65-year old women who were not in the labor force at all between 1957 and 1971. Self-employment income for the years 1963 and 1964 was imputed for the persons (less that 0.2 percent of white males) who could tentatively be identified as self-employed physicians, who were not covered by social security on a mandatory basis prior to 1965.

** The contents of the LEED and SE files are detailed in U.S. Social Security Administration, Office of Research and Statistics, Some Statistical Research Resources Available at the Social Security Administration, 1975.

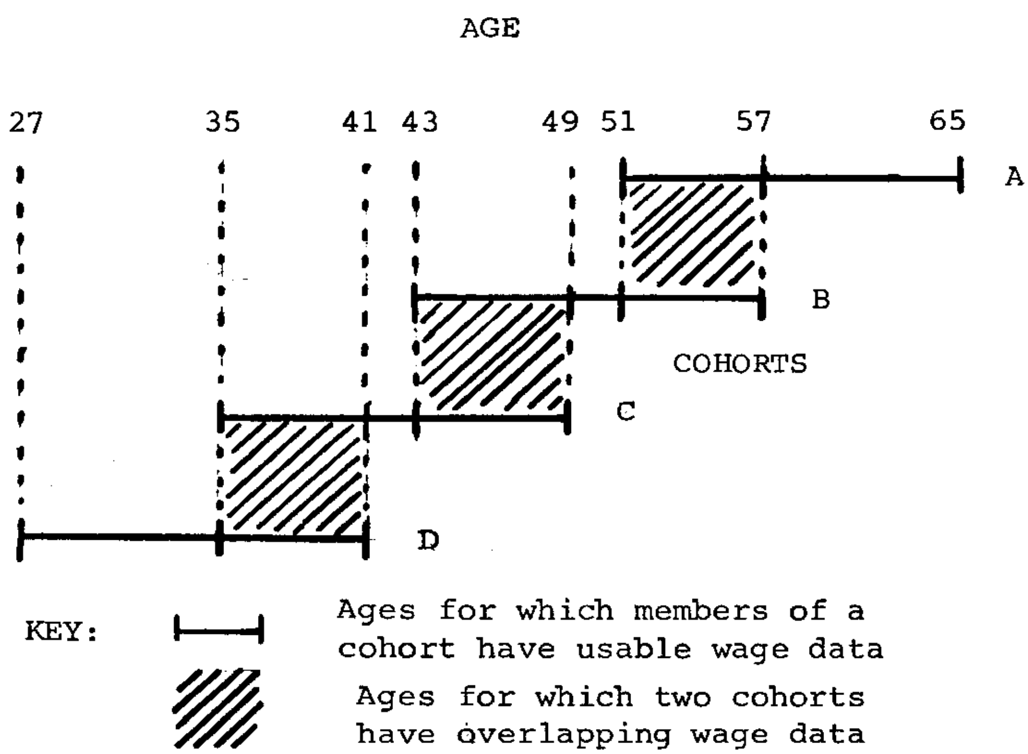

FIGURE 1.--MATCHING COHORTS

Individuals from different age cohorts were matched in the following way. Persons in each cohort were grouped into cells by sex, race, region, and industry of primary employment in 1971 and 1963. Three regions were used--south, west, and other.* Two-digit industries were combined into six categories--agriculture; mining, construction, and transportation; manufacturing; trade and personal services; finance, government, and professional services; and self-employment.** Each individual's earnings were expressed as a fraction of the average earnings in the particular region/industry cell for the given year, i.e., as a relative wage.

The earnings history of a person who was a given age (57, 49, or 41) in 1963 was matched with that of a person who was that same age in 1971 and who was also of the same race and sex. If the person in the older cohort had a non-zero wage in 1963, he was paired with the person from the younger cohort in the same region and industry who had the closest wage relative in 1971, as long as their wage relatives did not differ by more than 10 percent or 0.05. If the person in the older cohort had

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* Regions included the following states: south--Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia; west--Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; other--everything else, including unknown, but excluding American Samoa, Guam, Puerto Rico, and the Virgin Islands.

** Industry groupings included the following two-digit SIC codes: agriculture--07-09; mining, construction, and transportation--10-17 and 40-49; manufacturing--19-39; trade and personal services--50-59, 70, 72, 75-79, 99, and unknown; finance, professional services, and government--60-67, 73, and 80-93.

no earnings in 1963, he was paired with the individual from the younger cohort who had no earnings in 1971, the same number of non-zero earnings figures during the six previous years, and the closest average relative earnings over the period. The next step, if necessary, was to drop the requirement that matched records be from the same industry and region. If a record was still not matched, the relative and absolute tolerance levels for the match were released. At this point the remaining records consisted exclusively of those with no earnings at all during the seven-year overlap period. These were matched randomly to other records with no earnings during the overlap period.* After the matches were complete the wage records were adjusted so that the relative earnings of two successively matched individuals were identical in the overlap year or years.

One important consequence of the matching procedure that we have employed is the pattern of female labor force participation that it produces. Over the last thirty years there has been a continual upward trend in aggregate female labor force participation. This trend is the result of two influences--a secular influence evidenced by an increase over time in the participation rates of the women of a given birth cohort, and a cohort influence

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* The fraction of records matched at each step of the routine may be illustrated with the data on white males. For this group about 70 percent of the records were matched to a record with a similar non-zero wage during the match year. An additional 18 percent of the records, all of which had no earnings in the match year, were matched on the basis of total earnings during the previous six years. Another 2 percent were matched across cells. And 1 percent were matched after releasing the tolerances. Ten percent of the records were matched randomly.

evidenced by an increase in the participation at each age of members of successive birth cohorts.

Generally speaking, our matching procedure produces a set of wage histories which reflect the secular influence but not the cohort influence.* The procedure insures that the 1971 labor force status of the younger worker in each match was identical to the 1963 labor force status of the older worker in the match. Thus the 1963-1971 labor force behavior of the 57-year olds used in the match is not representative of the average 1963-1971 labor force behavior of all 57-year olds. Rather it is generally representative of the behavior between the ages of 49 and 57 of those persons turning 65 in 1971.

The particular birth cohort which the earnings histories are designed to represent can be altered by altering the sampling procedure. The earnings histories presented in this paper are constructed by sampling the records of women turning age 65 in 1971 and matching to them records from younger cohorts. In theory, a sample representing the records of women turning 65 in 1995 could be produced by reversing the process--that is, by drawing the sample from the records of women turning 41 in 1971 and matching to them records of members of older cohorts.

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* The secular influence on female labor force behavior contained in our earnings histories is not the secular pattern of any actual birth cohort. Our wage histories reflect the pattern which prevailed in the 1963-1971 period, and that pattern is repeated four times in each of our wage histories.

B. Statistical Reliability of the Data

In our match procedure a person's estimated wage at age 58, 50, or 42 depends on his race and sex and on his industry of employment and relative earnings in the prior year. Alternatively, the data from 1963 to 1971 could be used to estimate a wage determination model in which an individual's relative earnings in a given year are a function of the same characteristics. As long as matches are made within characteristic cells, the match technique is equivalent in the match years to a stochastic simulation with the estimated model.* Since few matches were made across cells, our sample should have approximately the same distribution as a sample produced by the model. In the years between the match years matching is superior to simulation, since the sequences of relative earnings are not hypothetical but represent the actual labor market behavior of individuals.

Our data could have been used to better advantage by looking at individuals' characteristics in more than one year. We might have required that the paired people have similar earnings, region, and industry not only at age 57, 49, or 41, but also at age 56, 48, or 40, or for a still longer period. However, this would have required maximizing some criterion function, since the two people who are most alike at one age are probably

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* See Christopher A. Sims, "Comments" and "Rejoinder," Annals of Economic and Social Measurement, 1: 343-46, 355-57 (July, 1972).

not those who are most alike at another. It would thereby have considerably lengthened the computation process, already involving more than 100 hours of CPU time spread over six months.

C. Other Adjustments

The results reported here are based on 20 percent of the sample of white males and females and 100 percent of the sample of other races (primarily black). The samples were weighted in producing the estimates for all races and sexes. From this subsample, persons who could be identified as dead or disabled from SSA's Continuous Work History Sample,* or to whom death or disability could be imputed, or who had fewer than ten years of covered earnings were removed.**

The relative wage figures in each earnings history were converted into wage-indexed numbers by multiplying them by $8031, annualized average covered earnings in the first quarter of 1974.*** They were expressed when needed in unindexed form using a series on average wages in the economy through 1936 through 1974. They were put in real terms using the Consumer Price Index for the same years. For this analysis it was assumed that the earnings base had always been 1.83 times average annual covered earnings, its approximate level today.

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* SSA, Some Statistical Research Resources.

** For example, the 20 percent subsample of white males consisted of 1919 individuals. After dropping 378 persons for death, 190 for disability, and 55 for lack of insured status, a final sample of 1295 earnings histories was left.

*** Myers, "The Case for Indexing," p. 11a.

APPENDIX B

MEAN PRIMARY INSURANCE AMOUNT
UNDER DIFFERENT BENEFIT COMPUTATION PLANS

Benefit Computation Plan	White Males	Black Males	White Females	Black Females	All Workers
1. No index, non-zero, LOS = none	$258	188	207	131	235
2. Wage index, non-zero, LOS = none	263	194	197	125	235
3. Price index, non-zero, LOS = none	260	191	202	128	235
4. Wage index, non-zero, LOS=10%/yr.	284	193	159	98	235
5. Wage index, 34/39, LOS=3.33%/yr.	287	193	153	97	235
6. Wage index, 34/39, LOS = none	277	194	171	111	235
7. Wage index, 10/15, LOS=10%/yr.	285	190	157	97	235
8. Wage index, 19/24, LOS = none	269	187	186	115	235
9. Wage index, 19/39, LOS = none	267	200	187	123	235
10. No index, 19/39, LOS = none	267	192	188	121	235
11. No index, 19/24, LOS = none	269	187	186	115	235

PLAN 1

2775 INSURED WORKERS

NO INDEX, NON-ZERO, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	357.55	129.56	120.54	101.28	189.63	409.45
2	286.22	193.74	192.10	209.81	246.51	314.57
3	222.32	319.64	320.26	318.71	273.57	190.42
4	174.45	432.78	437.98	424.20	342.75	113.65
STD. DEV.						
1	98.99	75.73	67.60	47.74	89.10	94.25
2	119.72	74.37	66.78	72.22	138.21	108.69
3	120.34	73.38	64.89	82.84	130.37	87.37
4	118.78	68.72	60.65	77.19	110.68	65.18
STANDARDIZED AMWS						
MEANS						
1	451.08	163.45	152.07	127.78	239.23	516.55
2	361.09	244.42	242.34	264.69	310.99	396.85
3	280.47	403.25	404.03	402.07	345.13	240.23
4	220.08	545.99	552.54	535.15	432.41	143.38
STD. DEV.						
1	111.19	85.06	75.92	53.62	100.08	105.87
2	134.47	83.53	75.01	81.12	155.23	122.09
3	135.17	82.42	72.89	93.04	146.43	98.13
4	133.41	77.19	68.12	86.70	124.31	73.21
STANDARDIZED PIAS	MEAN PIA FOR GROUP =			234.60		
MEANS						
1	287.46	150.63	143.89	130.52	195.68	312.67
2	250.20	203.42	204.00	213.16	222.49	265.73
3	212.44	269.58	269.96	268.99	241.65	198.08
4	179.91	324.23	326.74	320.09	279.85	138.31
STD. DEV.						
1	49.24	64.63	61.68	53.57	59.77	46.83
2	64.74	45.36	39.57	41.65	84.94	56.40
3	73.33	35.67	31.30	40.58	73.39	56.59
4	79.31	33.15	29.25	37.23	55.98	60.60

PLAN 2

2775 INSURED WORKERS

WAGE INDEX, NON-ZERO, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	868.64	467.46	454.21	238.43	701.24	981.04
2	690.52	474.83	459.41	490.27	653.90	743.69
3	549.08	718.05	720.86	785.39	611.11	494.40
4	433.03	965.49	987.70	1063.72	654.33	315.00
STD. DEV.						
1	235.88	282.62	277.67	77.33	242.81	240.09
2	274.96	223.91	211.21	86.54	336.71	246.09
3	266.55	210.94	187.51	87.85	303.15	207.42
4	233.05	177.28	156.91	78.46	201.16	153.58
STANDARDIZED AMWS						
MEANS						
1	449.37	241.83	234.97	123.34	362.77	507.52
2	357.22	245.64	237.67	253.63	338.28	384.73
3	284.05	371.47	372.92	406.30	316.15	255.77
4	224.02	499.47	510.96	550.29	338.50	162.96
STD. DEV.						
1	169.66	203.27	199.71	55.62	174.64	172.68
2	197.76	161.05	151.91	62.25	242.18	177.00
3	191.72	151.72	134.86	63.19	218.04	149.19
4	167.62	127.51	112.85	56.43	144.68	110.46
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	284.47	189.54	185.46	128.50	250.96	305.95
2	247.46	200.18	198.01	212.92	234.46	259.34
3	214.22	255.95	256.73	269.14	227.38	204.92
4	185.19	303.45	307.69	322.17	242.50	152.34
STD. DEV.						
1	46.54	77.41	77.62	41.68	50.96	47.68
2	60.13	56.00	52.28	16.49	79.96	51.86
3	66.96	41.15	36.07	16.74	71.55	54.00
4	65.16	33.77	29.89	14.95	42.20	56.93

PLAN 3

2775 INSURED WORKERS

PRCE INDEX, NON-ZERO, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	615.87	277.03	262.86	172.07	408.89	700.41
2	492.65	336.30	328.90	354.23	444.10	534.93
3	385.81	529.23	531.94	552.78	452.79	338.74
4	301.44	713.91	727.20	741.98	527.17	208.27
STD. DEV.						
1	165.35	160.33	151.89	63.99	156.16	156.91
2	196.86	139.07	125.40	81.48	236.13	170.48
3	186.12	131.61	113.79	87.78	216.77	136.27
4	165.15	112.59	96.89	81.19	158.11	102.00
STANDARDIZED AMWS						
MEANS						
1	450.37	202.58	192.22	125.83	299.01	512.19
2	360.26	245.93	240.51	259.04	324.75	391.18
3	282.13	387.00	388.99	404.23	331.11	247.71
4	220.44	522.05	531.78	542.59	385.50	152.30
STD. DEV.						
1	141.40	137.10	129.89	54.72	133.54	134.18
2	168.35	118.93	107.23	69.68	201.93	145.78
3	159.16	112.55	97.31	75.06	185.37	116.53
4	141.23	96.28	82.86	69.43	135.20	87.22
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	285.24	171.40	165.26	129.73	224.73	308.26
2	248.87	202.47	201.85	214.08	228.22	262.34
3	213.67	262.16	263.02	268.69	234.46	202.24
4	182.90	312.27	315.87	319.86	260.72	145.47
STD. DEV.						
1	46.32	69.65	68.58	46.07	51.93	44.12
2	60.85	49.34	43.76	24.03	81.38	50.43
3	66.50	36.12	30.88	23.74	70.94	51.41
4	66.78	30.45	26.21	21.96	45.48	56.43

PLAN 4

2775 INSURED WORKERS

WAGE INDEX, NON-ZERO, LOS = 0.10/YR

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	868.64	467.46	454.21	238.43	701.24	981.04
2	690.52	474.83	459.41	490.27	653.90	743.69
3	549.08	718.05	720.86	785.39	611.11	494.40
4	433.03	965.49	987.70	1063.72	654.33	315.00
STD. DEV.						
1	235.88	282.62	277.67	77.33	242.81	240.09
2	274.96	223.91	211.21	86.54	336.71	246.09
3	266.55	210.94	187.51	87.85	303.15	207.42
4	233.05	177.28	156.91	78.46	201.16	153.58
STANDARDIZED AMWS						
MEANS						
1	449.37	241.83	234.97	123.34	362.77	507.52
2	357.22	245.64	237.67	253.63	338.28	384.73
3	284.05	371.47	372.92	406.30	316.15	255.77
4	224.02	499.47	510.96	550.29	338.50	162.96
STD. DEV.						
1	169.66	203.27	199.71	55.62	174.64	172.68
2	197.76	161.05	151.91	62.25	242.18	177.00
3	191.72	151.72	134.86	63.19	218.04	149.19
4	167.62	127.51	112.85	56.43	144.68	110.46
STANDARDIZED PIAS		MEAN PIA FOR GROUP = 234.60				
MEANS						
1	363.98	128.17	119.18	87.65	202.53	361.39
2	282.79	182.50	177.43	189.04	246.29	279.95
3	171.19	281.39	284.12	283.05	239.30	175.10
4	94.93	362.11	370.56	378.35	218.53	95.43
STD. DEV.						
1	65.04	77.09	70.15	50.71	98.11	99.70
2	82.99	90.40	81.94	65.73	132.74	99.27
3	64.42	89.05	82.37	75.88	120.31	77.82
4	43.39	76.20	68.71	70.39	93.02	53.77

4

PLAN 5

2775 INSURED WORKERS

WAGE INDEX, 34 / 39, LOS = 0.033/YR

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	906.90	288.36	266.52	151.96	505.36	949.90
2	682.90	387.83	367.04	383.92	593.90	687.60
3	392.63	673.32	680.26	703.84	563.21	376.43
4	202.17	959.03	988.40	1031.81	528.19	186.55
STD. DEV.						
1	240.54	216.09	193.62	81.40	281.69	302.85
2	286.84	247.54	220.02	144.70	383.99	298.17
3	201.69	264.23	241.60	190.09	350.31	203.66
4	120.93	227.09	202.04	180.48	262.27	112.94
STANDARDIZED AMWS						
MEANS						
1	535.85	170.38	157.48	89.79	298.60	561.26
2	403.50	229.15	216.87	226.84	350.91	406.27
3	231.99	397.84	401.94	415.87	332.78	222.42
4	119.46	566.65	584.01	609.66	312.08	110.23
STD. DEV.						
1	184.90	166.10	148.83	62.57	216.53	232.79
2	220.49	190.28	169.12	111.23	295.16	229.20
3	155.04	203.10	185.71	146.12	269.28	156.54
4	92.95	174.56	155.30	138.73	201.60	86.81
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	372.60	122.45	113.30	84.77	199.49	369.60
2	286.40	178.31	172.14	181.44	246.83	281.68
3	164.78	282.05	284.75	284.01	240.09	170.25
4	87.14	373.46	383.20	391.19	217.42	92.00
STD. DEV.						
1	72.63	76.66	68.72	52.70	103.80	108.92
2	89.51	93.55	83.38	65.92	140.54	108.87
3	61.02	96.27	89.15	82.35	127.81	79.43
4	43.35	84.52	76.39	79.39	100.45	53.23

PLAN 6

2775 INSURED WORKERS

WAGE INDEX, 34 / 39, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	906.90	288.36	266.52	151.96	505.36	949.90
2	682.90	387.83	367.04	383.92	593.90	687.60
3	392.63	673.32	680.26	703.84	563.21	376.43
4	202.17	959.03	988.40	1031.81	528.19	186.55
STD. DEV.						
1	240.54	216.09	193.62	81.40	281.69	302.85
2	286.84	247.54	220.02	144.70	383.99	298.17
3	201.69	264.23	241.60	190.09	350.31	203.66
4	120.93	227.09	202.04	180.48	262.27	112.94
STANDARDIZED AMWS						
MEANS						
1	535.85	170.38	157.48	89.79	298.60	561.26
2	403.50	229.15	216.87	226.84	350.91	406.27
3	231.99	397.84	401.94	415.87	332.78	222.42
4	119.46	566.65	584.01	609.66	312.08	110.23
STD. DEV.						
1	184.90	166.10	148.83	62.57	216.53	232.79
2	220.49	190.28	169.12	111.23	295.16	229.20
3	155.04	203.10	185.71	146.12	269.28	156.54
4	92.95	174.56	155.30	138.73	201.60	86.81
STANDARDIZED PIAS		MEAN PIA FOR GROUP =		234.60		
MEANS						
1	329.96	151.35	144.09	102.73	223.16	340.10
2	271.96	188.08	183.71	194.63	240.43	271.83
3	192.27	270.55	272.50	278.50	234.44	186.48
4	124.79	343.18	350.65	361.65	230.20	118.07
STD. DEV.						
1	61.07	77.45	73.23	47.47	78.77	79.24
2	75.59	75.72	67.91	41.70	112.06	81.29
3	63.27	67.47	61.32	48.22	101.28	65.24
4	55.66	57.64	51.21	45.75	73.10	54.46

PLAN 7

2775 INSURED WORKERS

WAGE INDEX, 10 / 15, LOS = 0.10/YR

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	956.92	108.53	66.30	204.90	219.51	994.84
2	746.97	432.62	417.89	467.48	555.54	765.29
3	418.50	812.29	827.02	749.83	695.54	394.46
4	244.32	1141.95	1166.89	1022.82	841.66	189.06
STD. DEV.						
1	254.76	152.89	79.92	160.64	273.41	283.83
2	347.44	219.51	139.46	278.64	405.78	355.30
3	346.75	200.11	141.03	363.36	381.01	322.56
4	274.16	115.23	73.42	332.18	346.99	206.19
STANDARDIZED AMWS						
MEANS						
1	521.24	59.12	36.11	111.61	119.57	541.89
2	406.88	235.65	227.63	254.64	302.61	416.85
3	227.96	442.46	450.48	408.43	378.86	214.86
4	133.08	622.02	635.61	557.13	458.45	102.98
STD. DEV.						
1	188.02	112.84	58.98	118.56	201.79	209.48
2	256.42	162.01	102.93	205.64	299.48	262.22
3	255.91	147.69	104.09	268.18	281.20	238.06
4	202.34	85.05	54.19	245.16	256.09	152.17
STANDARDIZED PIAS		MEAN PIA FOR GROUP =		234.60		
MEANS						
1	405.22	45.84	30.50	79.77	97.98	387.38
2	303.21	172.27	166.23	176.95	230.02	295.79
3	135.04	310.31	314.85	286.51	268.18	150.78
4	58.26	429.49	440.35	399.35	266.58	66.25
STD. DEV.						
1	84.77	62.43	40.34	67.50	118.81	124.39
2	115.38	93.14	69.20	110.29	163.87	141.93
3	96.33	99.77	85.46	140.38	154.08	117.42
4	57.54	79.03	66.55	133.20	145.58	70.00

PLAN 8

2775 INSURED WORKERS

WAGE INDEX, 19 / 24, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	956.13	205.18	165.11	177.90	318.84	1000.92
2	749.56	421.22	399.81	435.38	581.27	756.31
3	426.71	764.86	782.03	754.63	660.82	388.70
4	200.45	1077.06	1109.10	1054.31	734.41	173.41
STD. DEV.						
1	246.95	197.64	155.96	118.06	300.45	278.11
2	317.61	250.21	189.88	211.51	402.44	327.56
3	271.90	242.22	199.28	288.57	371.97	258.25
4	177.04	180.93	143.66	271.51	316.56	149.58
STANDARDIZED AMWS						
MEANS						
1	527.29	113.15	91.06	98.11	175.84	551.99
2	413.37	232.30	220.49	240.10	320.56	417.09
3	235.32	421.81	431.28	416.17	364.43	214.36
4	110.54	593.98	611.65	581.44	405.01	95.63
STD. DEV.						
1	183.39	146.77	115.82	87.67	223.12	206.53
2	235.87	185.81	141.01	157.07	298.86	243.25
3	201.92	179.88	147.99	214.30	276.23	191.78
4	131.47	134.36	106.69	201.63	235.09	111.08
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	332.43	110.38	95.43	108.73	144.29	342.39
2	280.14	193.07	191.13	195.46	227.01	280.37
3	191.74	285.33	289.65	278.54	254.25	178.98
4	110.91	362.30	370.19	354.63	275.65	101.43
STD. DEV.						
1	61.10	80.09	70.22	60.44	104.96	73.15
2	81.62	72.56	53.64	69.42	117.54	87.61
3	81.64	59.88	49.07	82.70	101.23	83.22
4	75.34	44.55	35.38	74.95	83.34	67.33

PLAN 9

2775 INSURED WORKERS

WAGE INDEX, 19 / 39, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	1019.02	473.59	450.96	247.93	759.12	1051.26
2	853.50	551.55	531.26	563.25	727.39	868.23
3	633.61	847.41	857.63	932.22	714.61	576.46
4	360.71	1113.42	1139.79	1179.16	773.57	319.92
STD. DEV.						
1	227.54	324.60	310.26	113.21	332.43	261.96
2	299.93	294.81	273.71	158.91	380.17	302.68
3	299.84	242.09	220.20	164.71	362.30	275.83
4	214.85	153.53	117.89	91.13	298.80	183.45
STANDARDIZED AMWS						
MEANS						
1	462.48	214.94	204.67	112.52	344.52	477.11
2	387.36	250.32	241.11	255.63	330.12	394.04
3	287.56	384.59	389.23	423.08	324.32	261.62
4	163.70	505.32	517.29	535.16	351.08	145.19
STD. DEV.						
1	153.29	218.67	209.01	76.27	223.95	176.48
2	202.05	198.61	184.39	107.06	256.11	203.91
3	202.00	163.09	148.34	110.96	244.07	185.82
4	144.74	103.43	79.42	61.40	201.29	123.59
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	293.15	174.20	168.35	118.11	243.21	298.06
2	262.85	200.66	198.17	212.06	231.13	264.43
3	218.37	263.58	265.57	278.43	231.03	206.37
4	150.14	309.61	314.16	320.94	246.97	139.21
STD. DEV.						
1	39.98	83.45	82.21	50.55	66.75	48.58
2	56.85	67.28	62.24	33.44	85.32	60.00
3	66.66	42.36	37.96	28.36	79.15	64.65
4	65.90	26.51	20.29	15.69	60.25	62.07

PLAN 10

2775 INSURED WORKERS

NO INDEX, 19 / 39, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	534.38	136.22	122.09	109.83	216.89	566.86
2	418.38	236.96	231.32	262.61	326.63	431.75
3	268.37	437.32	439.22	436.11	381.23	239.49
4	147.40	631.78	642.29	599.75	442.87	119.78
STD. DEV.						
1	151.75	98.33	83.43	66.48	133.34	160.96
2	180.19	111.14	92.22	112.71	210.95	178.18
3	150.28	109.52	89.16	142.13	211.01	137.37
4	110.95	99.19	83.61	141.46	181.60	85.55
STANDARDIZED AMWS						
MEANS						
1	505.82	128.94	115.56	103.96	205.30	536.56
2	396.02	224.30	218.95	248.57	309.17	408.67
3	254.02	413.94	415.74	412.79	360.85	226.69
4	139.52	598.01	607.95	567.69	419.20	113.38
STD. DEV.						
1	147.64	95.66	81.17	64.68	129.72	156.60
2	175.30	108.13	89.72	109.65	205.23	173.35
3	146.21	106.56	86.74	138.28	205.30	133.65
4	107.95	96.51	81.35	137.63	176.68	83.23
STANDARDIZED PIAS	MEAN PIA FOR GROUP =			234.60		
MEANS						
1	316.28	127.27	118.83	112.53	174.73	328.68
2	268.65	191.93	191.39	203.26	221.66	273.52
3	202.27	277.78	278.55	276.39	249.07	188.93
4	133.80	355.19	359.37	342.18	278.06	116.82
STD. DEV.						
1	60.87	66.85	61.64	55.70	72.44	66.46
2	75.23	53.80	44.30	54.19	101.19	75.77
3	72.19	43.65	35.48	59.20	94.75	69.20
4	70.12	39.48	33.28	57.28	76.78	61.53

PLAN 11

2775 INSURED WORKERS

NO INDEX, 19 / 24, LOS = NONE

LEVEL	GAPS	FRIEDMAN	LAST 10	LIFE NONZERO	TREND	VARIABILITY
UNSTANDARDIZED AMWS						
MEANS						
1	532.66	86.90	69.88	98.12	149.41	562.88
2	406.83	219.75	213.45	242.99	307.96	417.91
3	231.08	430.64	433.98	411.46	373.08	208.85
4	118.70	628.79	640.37	583.42	435.21	94.34
STD. DEV.						
1	154.34	83.68	62.37	71.02	146.93	167.55
2	188.10	113.89	87.29	129.73	222.27	191.95
3	162.23	116.24	92.68	173.88	216.16	147.94
4	118.55	104.28	87.01	175.71	189.61	87.96
STANDARDIZED AMWS						
MEANS						
1	532.66	86.90	69.88	98.12	149.41	562.88
2	406.83	219.75	213.45	242.99	307.96	417.91
3	231.08	430.64	433.98	411.46	373.08	208.85
4	118.70	628.79	640.37	583.42	435.21	94.34
STD. DEV.						
1	154.34	83.68	62.37	71.02	146.93	167.55
2	188.10	113.89	87.29	129.73	222.27	191.95
3	162.23	116.24	92.68	173.88	216.16	147.94
4	118.55	104.28	87.01	175.71	189.61	87.96
STANDARDIZED PIAS	MEAN PIA FOR GROUP = 234.60					
MEANS						
1	337.35	92.55	80.46	107.42	129.25	350.19
2	278.04	188.51	188.29	194.84	221.15	281.64
3	187.21	290.50	292.03	277.19	258.88	174.45
4	113.34	381.64	386.97	358.61	290.28	99.26
STD. DEV.						
1	71.23	68.96	58.61	62.03	97.71	81.30
2	89.64	60.14	44.14	76.61	119.65	95.00
3	89.31	53.47	42.63	90.81	108.16	86.88
4	83.79	47.97	40.02	88.21	92.69	69.38