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MODELLING ALTERNATIVE SOLUTIONS TO THE
LONG-RUN SOCIAL SECURITY FUNDING PROBLEM

Michael J. Boskin

Marcy Avrin

Kenneth Cone

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1050 Massachusetts Avenue
Cambridge MA 02138

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ABSTRACT

This paper develops a Social Security simulation model. Combining data from the 1975 Social Security Exact Match File, which merges individual records from the 1975 Current Population Survey with OASI earnings and benefit records, with a model of income growth, retirement and labor force participation patterns, life expectancy, age-earnings profiles, etc., we present estimates of a variety of types of information concerning the long-run financial status of the OASI system.

Estimates are developed for current legislation and a variety of possible reforms of the aggregate real present value of benefits, taxes and deficit; and expected benefits, taxes and net transfers for different population groups by age and income.

Among the more important findings of the first in a series of analyses using the simulation model are the following:

1. Under OASI alone, the long-run deficit amounts to \$632 billion in 1977 dollars. This is roughly the size of the regular privately held national debt. This occurs primarily because of the impending large increase in the ratio of retirees to workers early in the next century and in spite of already legislated impending large payroll tax increases.
2. The long-run deficit is quite sensitive to assumptions concerning productivity growth and the length of the retirement period. For example, a one year increase in the latter (perhaps due to a gain in life expectancy) increases the real present value of the deficit by about \$250 billion.
3. Current retirees and older workers will be receiving a large multiple of taxes paid plus interest. Younger workers ultimately will not even break even. The overall pattern of benefits, taxes and transfers will depend heavily upon the time pattern of responses to the deficit and the form the response takes.
4. Several types of options exist for eliminating the deficit and even for freeing up resources for other purposes. Delaying retirement by three years on average relative to current patterns will eliminate the deficit (mainly reducing total benefits paid); and separating the transfer and annuity components of the system also offers potentially large deficit reductions (but implies part of the sum will be used to finance an expanded transfer payment system from general revenues).

Michael J. Boskin
National Bureau of Economics
204 Junipero Serra Boulevard
Stanford, California 94305
(415) 326-7160

Marcy Avrin and Kenneth Cone
National Bureau of Economic Research
204 Junipero Serra Boulevard
Stanford, California 94305
(415) 326-7160

Department of Economics
Stanford University
Stanford, California 94305
(415) 497-3978

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by

Michael J. Boskin
Marcy Avrin
Kenneth Cone

1. Introduction

Since its enactment, the Social Security System has enjoyed unique popularity among public income support programs. In the past several years, however, rising payroll taxes, a huge long-term deficit and concerns over its effects on the economy have led an increasing number of observers to conclude that Social Security is in urgent need of reform.

This system serves two major goals: to replace income lost at retirement, and to provide minimum income support for the aged. The former, the insurance goal, is based on earned entitlements; the welfare, or transfer, goal aims at social adequacy of support. Each goal enjoys wide public support as well as important policy justifications. For example, imperfections in the private annuities market and imperfect foresight regarding future incomes, inflation, life expectancy, etc., may lead many citizens to "undersave" for retirement, forcing them as general charges on the public via welfare or other programs in the absence of Social Security.

Over the last four decades, the Social Security System has helped mitigate these problems in an important way. It has provided substantial

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income security to the elderly; it has kept many elderly persons out of extreme poverty; and it has transferred billions of dollars annually from the younger, wealthier generation of workers to the older, poor generation of retirees. These are significant achievements indeed. However, the System, which was designed decades ago, has not kept up fully with rapidly changing economic, social, and demographic conditions. It is having several substantial and probably unintended adverse effects on the overall economy; and it faces a long-term funding crisis of immense proportions.

Social Security is thought of in several alternative ways: as an actuarially fair pension fund; as a separable system of taxes and transfer payments; and as a pure consumption loan intergenerational transfer program where each generation transfers a fraction of its labor income to the retired generation with the expectation that the succeeding generation will treat it similarly. In truth, the existing Old Age Survivors Insurance (OASI) System is none of the above, but has components of each (as well as additional complexities).

The current System differs from the private pension fund analogue in several respects. First, it is unfunded in that current payouts are financed by contemporaneous "contributions" or taxes. This had the advantage of allowing retirement benefits to be initiated immediately making the initial recipients "windfall" beneficiaries. That is, they received retirement income supplements with little or no previous contributions. Income was similarly transferred from the initial working population to the initial retirement generation. This intergenerational transfer has continued as the system has matured, although the net transfer (the expected value of a participant's receipts less payments) has diminished. One drawback of this system is that while people

accumulate future claims against the system, no corresponding wealth accumulation occurs for the system as a whole. Thus, while the working population is being forced to "save," no funds are made available for capital formation in the economy. At any point in time, the system is "bankrupt" in that it has massive future retirement obligations and only a relatively trivial amount of assets. A government can operate such a system because of its powers to tax future income in order to finance its obligations.

There are other major differences between Social Security and the private annuity or pension fund analogue. The benefits are distinctly tilted in favor of the low income worker, the worker with a short work history, and the retiree with a spouse with an uncovered work history and those with little retirement income. That is, relative to a system where each participant earned a common rate of return on his or her contributions, the current Social Security System involves a set of taxes and transfers. This redistribution within a generation, in contrast to the intergeneration transfer mentioned above, is accomplished by such mechanisms as a progressive benefit formula, a minimum benefit, a uniform dependent's benefit, and an earnings test.

2. The Major Problems Confronting Social Security

Three major sets of problems plague Social Security today. The first is the issue of equity--both inter- and intra-generational. A large proportion of benefits received by retired workers is really an intergenerational transfer. Also, different groups in a given generation of the population are treated differently by the Social Security System. Lower income workers receive a higher fraction of their previous earnings in benefits than do high-income workers; married couples usually receive half again as much

as single persons with the same earnings history for the primary earner; those with short-covered earnings histories are favored, etc.

A second set of problems plaguing the Social Security System is the potentially adverse effects that it may have on private incentives to work, save, hire workers, etc.

Probably the most overwhelming problem confronting Social Security as a pay-as-you-go system is the long-term funding crisis. Even after the 1977 Social Security Amendments, a long-term deficit in the OASI System of well over \$600 billion (in 1977 dollars) remains. This is the amount by which the present value of legislated benefits exceeds the present value of legislated taxes. To put this in perspective, this amount is about the size of the privately-held regular national debt. The major cause of this projected deficit is the drastic change in the age structure of the population. Once the post-World War II baby boom retires (around 2010) the ratio of retirees to workers will increase enormously. The best estimate is that the ratio of retirees to workers will increase by over 60 percent--from slightly less than one to three to about one to two. Given the pay-as-you-go nature of the System, this implies either a huge increase in taxes to maintain the ratio of benefits to before-tax wages or a significant decline in the ratio. Neither prospect is appealing, but there is no avoiding the choice.

In addition to the rapidly changing age structure of the population, the trend to earlier retirement combined with increased life expectancy has increased the average length of retirement considerably. In 1948 one-half of all males over the age of 65 were in the labor force; today that figure is only one in five. The average life expectancy of the elderly has increased over two years since 1960. Thus, the length of the average retirement period

has increased by about one-third over the last three decades. This has greatly strained the financial resources of the elderly; to achieve any given level of annual consumption, a retiree now needs substantially greater savings, intrafamily transfers, or public support.

What does all this imply for the long-run financial outlook for Social Security? Even the massive tax increases of the 1977 Amendments will prove insufficient to finance the program through the first half of the next century. If the current law is maintained until 2025, payroll tax rates would have to increase by more than 8 percentage points to meet benefit payments.¹ This would imply combined employer and employee tax rates of about 23 percent of payroll! Given the huge outcry against the large (but much smaller) increases legislated in 1977, it is clear that the time has come to reexamine the future course of Social Security. The alternative is continued unpopular tax increases which add to costs and prices, reduce net wage rates, redirect the system further from an earned entitlements or annuity basis and continually erode public support of the Social Security System.

While several short-run "quick fixes" have been proposed, such as bringing into the system those, such as government employees, not currently included, or eliminating the ceiling on taxable earnings, these cannot produce a reduction in the long-term deficit unless they are accomplished in a manner which is actuarially disadvantageous to the groups concerned.² For example, bringing government employees under Social Security would increase current tax revenues, but add to future obligations. This could only reduce the deficit if government employees were given a "bad" deal. But we could then expect them to resist such a proposal en masse.

3. The Transfer and Annuity Components of Social Security

In order to appreciate the relation between the annuity and the intergenerational transfer components of Social Security, let us begin by examining the most extreme case: the first cohort of retirees under the U.S. Social Security System. Consider an individual who was age 62 in 1937 and retired in 1940 at age 65.

For a worker making average earnings and investing the sum of employer and employee contributions at interest rates then prevailing, the accumulated retirement principal in 1940 would have been only \$68.36, yielding an annuity of \$6.59 per year. Clearly, benefits far in excess of contributions would be required if any substantial benefits were to be paid.

The actual average annual benefit paid in 1940 to a male age 65 was \$270.60. Since an annuity would have yielded only \$6.59, \$264.01 of the benefits were a pure transfer, or welfare payment.³ Since the benefits may and, in fact, did change over the retirement period, it is more convenient to compare capitalized savings and benefits over the expected time span than to compare annuity payments and annual benefits. For the individual in question, the present value of lifetime benefits was \$2,962.09, of which \$2,893.73 was a transfer. Thus, this individual paid for only 2.3% of the benefits received. This percentage has been increasing for individuals over time. Those retiring at age 65 in 1970 paid for approximately 32 percent of the benefits received.

Different individuals receive vastly different "deals" in the sense of the ratio of benefits received to taxes paid plus interest. This occurs

for a number of reasons including the progressive benefit formula, the minimum benefit, the spouse's benefit, the different periods of coverage, etc.

4. Separating the Transfer and Insurance Components

Many problems in the Social Security System relate to the conflict between its twin goals of earned benefits and income adequacy. Most critics of the program propose reforming it in the direction of one goal or the other. Separating the transfer and annuity goals would have different effects on individuals depending on their age, income, industry, etc.

The three sets of problems plaguing Social Security--the long-term funding deficit, the apparent inequities, and the adverse incentives--have generated much interest in a set of reforms. One of these is the separation of the transfer and annuity goals of the program. In principle, it may be desirable to separate the financing of these different goals of the system.

Separating the transfer and annuity functions of the Social Security System and funding them, respectively, out of general revenues and earmarked payroll taxes has been recommended for a number of reasons.

First, the current system is so complex as to obscure the relation between contributions and benefits and impede a rationalization by firms and employees of total retirement support, private pension plus Social Security.

Second, as we shall demonstrate presently, many groups in the population are getting a "bad" deal from Social Security compared to an actuarially fair system. Separating the transfer and annuity goals would provide the same rate of return for all workers under Social Security's annuity program.

The inequities which undermine support of the System, would be eliminated in this part of the program.

Third, transfers to the elderly poor (beyond SSI) could be financed from general revenues. Many object to financing an income guarantee for the aged poor from a tax which bears so heavily on the working poor. The current income tax exemptions, deductions, and low-income allowance, which together exempt the first several thousand dollars of earnings from tax, indicate the general belief that those at the very bottom of the income scale should not have to help finance general income support programs.

The same argument applies to any intergenerational transfers providing earnings-related benefits beyond those provided by pure insurance and the minimum income guarantee. Many object to a system in which current unskilled workers surrender income (beyond their own insurance) to subsidize retired professionals beyond actuarially fair returns.

In separating the insurance from the transfer goals, general revenue financing would also require the transfer goals to compete openly with other government priorities, including tax cuts. General revenue financing would permit policymakers and the public openly to determine the value of transfers to the elderly in relation to other social priorities and to promote cost-effective measures for doing so. It will permit differential needs assessment to deal with different circumstances (marital status, etc.) in the context of a transfer program, where many precedents for doing so already exist.

5. Towards a Solution

As we begin to grapple with the immense problems of the Social Security System, from the apparent inequities and inefficiencies, to the long-term deficit, serious consideration should be given to two major reforms: separating the dual functions of Social Security and to financing them separately; and to raising average retirement ages. Separating the transfer component of the system and funding it out of general revenues would encourage more cost effective transfers and enable us to strengthen the earned entitlements functions which, in turn, would eliminate many inequities and help restore public confidence in the financial integrity of the system. Raising retirement ages would relieve much of the financial pressure on Social Security and make much sense in view of other labor force and demographic changes.

In this paper, we have analyzed a series of long-run policy alternatives along these lines and have calculated the projected costs and benefits of each for workers of different ages. The age cohorts, cohorts 1 through 5, are ages 25-34, 35-44, 45-54, 55-64 and 65+, respectively. Cohort X is less than 25 years. We have also calculated the implications of these alternatives with regard to the Social Security surplus or deficit to the year 2050. Basically, for each alternative, we ask the following: for each age cohort, what is the ratio of the present value of benefits it can expect to receive at age 65 to the accumulated value of lifetime contributions to Social Security? What is the result in terms of the present value of the deficit of the Social Security System retirement through 2050?

We have investigated these questions in terms of the following alternative plans:

1. The "Base Case" analyzes the Social Security System as it stands today.⁴
2. The "Trans" alternative reduces benefits to eliminate transfers for cohorts 2-5.
3. The "Trans 80" alternative eliminates transfers and adjusts taxes in 1980 to close the future deficit as of 1980. (Taxes were actually lowered by 1.5% of income.)
4. The "Tax 80" alternative raises taxes 1.7% of income in 1980 to close the future deficit as of that year.
5. The "Tax 2030" alternative raises taxes by 3.9% of income in 2030 to close the future deficit as of that year.
6. The "Ret" alternative increases retirement ages so as to add an average of three years to working lives.

Thus, these alternatives allow us to determine the effects of decreasing benefits by eliminating transfers, increasing taxes and increasing the retirement age.

In order to understand the basis of these calculations, it is important to consider the data on which they are based, the method of analysis used and the assumptions upon which they rely.

Data

The data used in the calculations are the 1975 Social Security Exact Match File that merges individual records from the 1975 Current Population Survey with OASI earnings and benefit records. With these data, the pattern

of actual OAI benefits, as well as lifetime contributions into the system by all individuals can be found. These data permit redistribution across cohorts to be separated from the annuity aspects and enable us to estimate values for individual households. Since the data used include only a sample of 5000 individuals in each cohort, sample weights and population statistics are used to generalize the sample results to the entire population. The weights are present on the file.

The data actually used in the analysis from the Social Security Longitudinal earnings tape include the sum of covered earnings from 1937-1950, covered earnings from 1951 to 1975, estimated quarters of coverage from 1937-1950 and actual quarters of coverage from 1951-1975.

From the 1975 CPS the following data were used: region, farm residence, age, sex, race, marital status, class of worker, occupation, industry, weeks worked in 1972 as a civilian, industry of longest civilian job in 1972, years of school completed, and wage and salary amount.

Method of Analysis

For cohorts 1-5 we determine the relationship between the summation of aggregate contributions and the expected aggregate benefits of all individuals currently in the Social Security System, assuming in all cases but "Ret" that the retirement age is 65 for husbands and singles and that wives retire with their husbands.⁵ For an individual, the value of total contributions into the System at the point of retirement is the summation of actual and expected OAI taxes paid both by himself and by his employer compounded by a real rate of interest (3% in the base case). These calculations use actual and forecasted income, historical and forecasted maximum taxable income limits and historical and forecasted tax rates.

The expected value of OAI benefits over the worker's remaining life is calculated considering the probability of survival and the wage index from Social Security Bulletin, Annual Statistical Supplement, 1975.⁶ Wives receive benefits based on their own or their husbands benefits, whichever is larger. The entire analysis is converted to 1977 dollars.⁷

In order to determine the expected contributions for individuals who have not yet reached the age of 65, we applied the contribution rates specified in the 1977 Amendments to the Social Security Act to known earnings and predicted future earnings for each individual. Earnings were predicted separately for males and females using an estimating equation based on positive 1972 earnings of all individuals in the sample. The predictions, determined from the estimated coefficients of the independent variables in the equation and the characteristics of the individuals, were indexed over time using 7% for inflationary earnings increases and the assumption of a 1.5% per year earnings increase due to productivity for the "Base Case."⁸ Female income is adjusted for labor force participation.⁹

More formally, we "age" our survey data so that we know both the past work history and the projected future work history and retirement benefits for the sample population. Having done this we calculate the present value of each household's total contribution at retirement. These are calculated as:

$$C_R^i = \sum_{t=1}^R C_t^i e^{r(R-t)}$$

where R is a given retirement age, and r is the interest rate "credited" to a Social Security "account" under our pension plan analogue. In fact,

all projected contributions and benefits are calculated so that they are the anticipated dollar amount times the probability of the individual surviving to that time.

We calculate the expected retirement benefits at age of retirement as:

$$B_R^i = \sum_{t=R}^N B_t^i e^{-r(t-R)}$$

where N is 100, beyond which the survival probability is taken to be zero.

Given that survival probabilities are already embedded in B_t and C_t , an actuarially fair system would be one where $C_R^i = B_R^i$. We define the expected present value of any transfer received by the participant as:

$$T_R^i = R_R^i - C_R^i.$$

The same type of analysis is performed for cohort X , which involves making several assumptions regarding the future.¹⁰

After performing the analysis of taxes and benefits by cohort for various scenarios, we sum the results in order to determine the budget surplus or deficit that results from each scenario.

6. An Overall Comparison of Alternative Social Security Situations

Let us begin by examining some general measures of the overall situation for the OASI system under alternative scenarios. In particular, we consider aggregate taxes, benefits, and deficit under alternative Social Security situations and, correspondingly, the total transfers and transfers as a percentage of income for alternative Social Security situations. The situations to be discussed include the base case, i.e. current law, including

currently legislated but not yet implemented tax increases; the base case with a slightly lower rate of productivity growth; two situations in which the transfer component is eliminated and dealt with separately under general revenues: Trans 80 and Trans; and Ret which increases the retirement age by three years. Table 1 presents estimates of the aggregate taxes, benefits, and resulting present value of the long-term deficit under these alternative scenarios. Recall that we are making very conservative assumptions with respect to the projected long-term deficit in considering the base case in order to try to maintain comparability, roughly speaking, with the assumptions made by the trustees of the Social Security System.

The base case is estimated assuming an annual rate of productivity growth of 1.5% per year, an annual inflation rate of 7% per year, and the total taxes and benefit are discounted at a real rate of 3% with all figures being presented in 1977 dollars. Thus for the base case, we note the total taxes amount to approximately \$3.3 trillion whereas total benefits amount to about \$4 trillion. Again, recall that these figures are adjusted for inflation and discounted to 1977. With these assumptions, the estimated long-term deficit amounts to \$632 billion. Recall that this does not include the hospital and disability insurance programs, in which case taxes, benefits and the deficit would all be substantially larger. This enormous deficit occurs primarily because of the changing age structure of the population noted above. When the baby boom generation starts to retire, we face the awkward prospect of an extremely large and rapid increase in the ratio of retirees to workers in our society. Even if the actuarial assumptions of the Social Security trustees are accurate--and we believe they are optimistic--we will have to raise Social Security taxes or lower Social Security benefits, or raise

Table 1

Aggregate Taxes, Benefits and Deficit under Alternative Reforms^a

| <u>Case</u> | <u>Total Taxes</u> | <u>Total Benefits</u> | <u>Deficit</u> |
|-------------------------------|--------------------|-----------------------|----------------|
| Base | 3336.9 | 3968.8 | 632.0 |
| Base with productivity = 1.0% | 2839.6 | 3570.5 | 731.0 |
| Trans '80 | 2798.6 | 2656.5 | -142.1 |
| Trans | 3336.9 | 2656.5 | -680.3 |
| Ret | 3500.9 | 3345.6 | -155.3 |

^aAll figures in billions of discounted 1977 dollars.

other tax revenues, or some combination of these options, by an enormous amount in the years ahead. This combination would have to amount to \$632 billion today: if we waited for the baby boom generation to retire the tax increase necessary will be between \$2½ and \$3 trillion in the year 2030.

The estimated taxes, benefits and deficit for the base case are very sensitive to the assumptions incorporated in making projections over the long term. Because of the importance of compounding even small differences in growth rates, even so small a difference as one-half of 1% in the rate of productivity growth increases the long term deficit--holding other assumptions constant--by almost \$100 billion in present value terms. Table 1 demonstrates that when the productivity growth assumption is lowered from 1½% to 1% per annum, the base case results in a decreased tax revenue, again in present value discounted dollars of almost \$500 billion to \$2.8 trillion, and a reduction in total benefits by about \$400 billion from slightly under \$4 trillion to slightly under \$3.6 trillion. The recent behavior of productivity does not give us much cause for optimism for restoring a rapid rate of economic growth in our economy, and does not augur well for the long-term deficit of Social Security.

Another assumption which is extremely important in the calculation of taxes, benefits and the deficit concerns the length of retirement. As noted above, forecasts of life expectancies made earlier drastically underestimated the rapid increase in the life expectancy of the elderly since 1960. In the last two decades, the life expectancy of the elderly increased about 3 years for women; 1½ years for men. Simultaneously, there has been a rapid acceleration of earlier retirement. In 1948, one-half of males over age 65 were in the labor force: today that figure is only one-fifth. If

either life expectancy increases still further or the trend to earlier retirement continues, the long-term deficit in Social Security will increase drastically. As a rough approximation, increasing the length of retirement, and eligibility for Social Security benefits, by an extra year would add about \$250 billion to the long-term deficit. Because the population has increased the length of its retirement period so much (by increased life expectancy and earlier retirement) and because we have an ever-growing fraction of the population which has entered the labor force later, shifted out of physically demanding and dangerous jobs, etc., one major avenue of reform of Social Security would be to raise the age at which people could collect Social Security benefits. We simulated one such scenario: raising the retirement age from 65 to 68, or more precisely, adding an average of three years to worklives. Going back to the other assumptions of the base case for productivity growth, inflation, etc., we note that such a move would result in a very modest increase in taxes from the additional years of work of about \$170 billion, but would result in a \$620 billion benefit decrease. Note that this would be accomplished without decreasing the annual benefit received by any worker once retired. The reduction in total benefits in discounted 1977 dollars comes about solely because people will be collecting benefits for a shorter period because of their later retirement. This changes enough to more than offset the impending enormous Social Security deficit and the impending enormous tax increases above and beyond those already voted. Indeed, such a program in conjunction with the other assumptions noted above would leave Social Security with a surplus of over \$150 billion. An alternative scenario, gradually raising the retirement age less rapidly

and not quite as high, could still put the Social Security System into a long-term balance. This scenario highlights the extreme importance of the length of the retirement period for the total benefits paid out and the long-term deficit of the System.

The long-term benefit payouts and tax collections, especially the former, are also extremely sensitive to the presence of the enormous percentage of transfer payments involved in Social Security benefits, especially for older, current workers and retirees. Leaving aside current retirees, two other scenarios were simulated in which the positive transfer payments currently accruing to people who have not yet retired were simulated: Trans and Trans 80. The Trans alternative removes the transfer component of benefits completely. They are assumed to be shifted to general revenues in a manner to be decided on the merits of the case once a genuine earned entitlement system is set up. We must note, however, that when they are shifted to general revenues and the transfer payment system for elderly is set up out of general revenues, this may obviously involve either increases in general revenue taxes or decreases in projected other government expenditures as well as the sharp reduction in payroll taxes and projected future payroll tax increases we are about to describe. Also, part of the reduced payroll tax revenue (about 20%) would be recouped automatically by increased taxes once the employer component of Social Security used to finance these transfers was no longer deductible from taxable income for other taxes. Under Trans, taxes will not go down at all, but total benefits will go down about one-third, from slightly under \$4 trillion to about \$2.7 trillion. This totally reverses the deficit picture from a two-thirds of a trillion dollar deficit to a two-thirds of a trillion dollar surplus discounted to 1977. The two-thirds of a trillion dollar surplus obviously

could result in further reductions in Social Security taxes from present levies, let alone totally eliminating the need for future tax increases. It could also be used to finance transfer payments if we shifted total transfers into general revenue.

The Trans 80 alternative substantially reduces taxes as well as total benefits. Indeed, the total benefits would be treated exactly as under Trans. The difference is that tax revenues would be reduced somewhat from 1980 on, leaving Social Security itself with a very modest surplus of \$140 billion and the substantial reduction in taxes from current levels. The tax reduction would be on the order of 1.5% of income from now on. That is, not only would we obviate the need for the already planned future tax increases legislated in the 1977 Amendment, and the projected enormous tax increases necessary to deal with the long-term deficit, but we would also enable Social Security to reduce current taxes by 1.5%. Again, transfers would be shifted to general revenues and the exact amount and nature of those transfers should be worked out in accord with general principles of transfer payments under general revenue finance.

This overall version of the total situation with respect to taxes, benefits, and the long-term deficit highlights not only the current extreme long-term deficit of the Social Security System as presently constituted, and the enormous tax increases above and beyond the 1977 legislated tax increases impending in view of the long-term deficit, but also the opportunities and possibilities for deriving a solution by rationalizing the benefit payments along the lines of separating the benefits paid to achieve the twin goals of Social Security: earned entitlement and income adequacy during retirement. It also highlights the extreme sensitivity of the

long-term deficit and benefit payments and tax receipts to such things as slower productivity growth and changes in the length of the retirement period. We might conclude this brief section by noting that the long-term future of Social Security is not something to be left to the long term to deal with. Every year we postpone dealing with the problem gives us one less year to generate a smooth transition to a more rational and cost effective system of providing adequate income support for our elderly population.

To analyze the transfer component involved in Social Security at the aggregate level in a little more detail, we present in Table 2 estimates of the total transfers and transfers as a percentage of total national income, under the same scenarios discussed above in conjunction with Table 1. We estimate here the total transfers to cohorts 2-5, leaving aside the issue of the transfers already being paid to retired workers. These will be discussed below under the disaggregated results. Obviously, most of the benefits being received by currently retired workers are in the nature of transfer payments. For the base case, under the standard, if optimistic, assumptions, total transfers to cohorts 2-5 would be almost \$2 trillion and amount to slightly under 5% of total national income! Placed in perspective, this is only slightly less than the share of income being devoted to defense expenditures. Under the standard assumptions of the base case with our slightly lower rate of productivity growth, transfers decline slightly to \$1¾ trillion but increase the percentage of the now smaller income (due to the lower productivity growth) to slightly over 5%. Obviously, under the Trans alternative total transfers have been eliminated completely and hence are zero in both the total and as a percentage of income; the

Table 2

Total Transfers and Transfers as Percent of Income, Various Reforms

| <u>Case</u> | <u>Total Transfers to Cohorts 2-5^a</u> | <u>Transfers as % of National Income</u> |
|-----------------------------|---|--|
| Base | 1,818.8 | 4.7% |
| Base with productivity = 1% | 1,746.3 | 5.3 |
| Trans '80 | 72.3 | 0.2 |
| Trans | 0 | 0 |
| Ret | 1,542.0 | 3.8 |

^aAll figures in billions of discounted 1977 dollars.

Trans 80 alternative allows transfers to be paid for several additional years before taxes are adjusted (remember we start from a base year of 1977, since that is when our data ends), and transfers would be virtually abolished in this case. Finally, we note that the increase in the retirement age would substantially reduce transfer payments by about \$275 billion to cohorts 2-5, and reduce transfers as a percentage of national income by approximately 1 percentage point. These enormous amounts for total transfers to cohorts 2-5 reveal that fundamental changes in Social Security towards separating the transfer and annuity goals of the program would involve major changes in the necessary taxes under Social Security.

7. Detailed Results for the Base Case

In order to present disaggregated figures concerning the benefits, taxes, and transfers received by the average family of different age and income, we will focus for the next few pages on the base case assumptions. Recall from the discussion above, however, that these assumptions may be somewhat optimistic and that slower productivity growth or increased retirement periods would add substantially to the taxes necessary to finance "promised" benefits. The base case simply ignores the long-term deficit and assumes that current workers will not be forced to pay any tax increases above and beyond those already legislated despite the enormous long-term deficit. Were part of the solution to the long-term deficit to gradually raise taxes above and beyond those increases already legislated, as discussed in the next section, the break given to current

workers would be substantially worse than under the base case; indeed, younger workers would lose substantially with respect to Social Security. Under the base case, assuming that taxes would not be raised until the baby boom generation retires or later, almost all current workers come out fairly well in terms of their average net benefits above and beyond taxes paid plus interest, but there is an enormous bad deal for workers under the age of 25 who will ultimately be forced to finance such benefits.

Table 3 analyzes the base case for six different age cohorts: current retirees (for simplicity persons over 65); for ten-year age intervals (25-34; 35-44; 45-54; 55-64) and cohort X, persons under the age of 25. The situation of a family in these ages is discussed in terms of a variety of estimates: the average tax paid per family in each age cohort; the average benefit received per family in each age cohort (the difference between the benefits and taxes); the average net benefit as a percentage of the taxes the family paid. Also included are discussions of the total taxes paid by the cohort and the total benefits paid to the cohort when they ultimately retire under current estimates, as well as the transfers as a percentage of total benefits received by the cohorts when they ultimately retire.

There are a variety of important points illustrated by the base case. First, the average tax per family, adjusted for inflation and discounted to 1977, will increase markedly as time goes by and hence is much higher for younger workers than older workers or current retirees. This occurs for a number of reasons: some of the retirees will not have paid taxes through their entire life; the tax rates actually paid and taxable ceiling used for each year have been growing through time and,

Table 3

Base Case

| | <u>65 +</u> | <u>64 - 55</u> | <u>54 - 45</u> | <u>44 - 35</u> | <u>34 - 25</u> | <u><25</u> |
|--|-------------|----------------|----------------|----------------|----------------|-----------------|
| Average Tax per Family | 7,058 | 18,345 | 33,883 | 53,326 | 73,843 | |
| Average Benefit per Family | 49,400 | 47,639 | 56,600 | 66,321 | 73,577 | |
| Average Net Benefit per Family | 42,343 | 29,294 | 22,718 | 12,994 | -267 | large, negative |
| Average Net Benefit as % Tax per Family | 600.0 | 160.0 | 67.0 | 24.4 | -.36 | |
| Total Taxes Paid by Cohort (billions) | 172 | 235 | 349 | 389 | 540 | 552+ |
| Total Benefits Paid to Cohort (billions) | 1,282 | 629 | 570 | 483 | 503 | |
| Transfers as % of Total Benefits | 86.6 | 62.7 | 38.8 | 19.4 | -7.39 | large, negative |

Assumes: 7% inflation
 1.5% productivity growth
 3% discount

N.B. for eligible survivors only

hence, the annual taxes paid have been growing through time and will continue under current law. The average tax paid in 1977 dollars adjusted for inflation will be 10 times as high for 25-34 year olds as for people currently retired.

Benefit payments increase much less rapidly through time and, hence, as we get to younger ages. Current retirees and persons soon to retire will receive benefits based not so much on what they paid in taxes, but upon an estimate of what the current tax revenue will support. Since the current tax revenues are levied at a higher rate and on a larger income base than were taxes collected from the current retirees and soon to be retired, their benefits are obviously much higher than the taxes paid plus interest. Therefore, 25-34 year olds will receive only about one-half again as much in the real 1977 value of benefits once they retire as current 65 and over beneficiaries. Again, recall the base case ignores the possible changes in life expectancies, or retirement patterns, as discussed above. Differencing the benefits and taxes reveals the enormous net benefits, or transfers, received by the current retirees and those who retire in the near future. The average current retiree receives about \$42,000 as a net transfer from the Social Security System by the taxes paid by current workers. This amounts to six times what these people, on average, paid plus interest. An average family in the next cohort, 55-64 year olds, will receive back 1.6 times what they paid in plus interest as a transfer payment, a total of slightly over \$30,000. The average net benefit, or transfer, declines as we get to progressively younger ages both in absolute amount and still more rapidly as a percentage of tax paid per family, since the latter will rise rapidly. By the time we get to younger workers 25-34 they are actually

losing in terms of the taxes paid plus interest being less than the average benefits they can expect to receive. Those persons under the age of 25 will suffer an enormous loss under the current calculation. Because of the untenable state of the long-run deficit, the current calculation is unrealistic for this young cohort, and we merely list their loss as large and negative. The total taxes paid and benefits received by each cohort follow the obvious pattern: taxes rising substantially as we pass through time. Again these tax amounts do not include any increases that must be voted if we are to close the long-run deficit by increasing taxes rather than decreasing benefits or by one of the structural reforms suggested in the alternatives discussed below. Transfers as a percentage of total benefits follow a pattern similar to those for the average family. The overwhelming bulk of benefits are transfers for current retirees; for the next cohort about 60% will be transfers; for the 45-54 age cohort slightly under 40%; the transfers will eventually vanish and become negative as we reach the younger cohorts. Obviously, for ages under 25 there will be a large negative transfer. Also, the transfers as a percentage of total benefits will decrease for all age cohorts not currently retired if we start to raise taxes now in anticipation of closing the deficit. The time pattern of such tax increases will be reflected in differential rates of reduction of the transfers as a percentage of total benefits for the different age groups. In the extreme, if we wait until the baby boom generation retires, the transfers as a percentage of total benefits will be an astoundingly large negative number for those currently under the age of 25.

Table 4 takes a deeper look at the net transfers received by individuals from Social Security in the different cohorts. We examine the net benefits received and the percentage break (the net benefits divided by the total benefits) for four different income classes. For each cohort, we note looking across the row of percentage break that the percentage break declines rapidly as income increases. For example, for the cohort 25-34 years old the percentage break goes from slightly over 8% for family income under \$6,000 to minus 2.5% for families with incomes above \$10,800. The same is true for each cohort. Again, for cohort 5, the current retirees, the percent break declines from 87.6% to 75.3% as we move up the income scale. This particular feature of the relationship between the percentage break and income reflects primarily the progressivity of the benefit payment formula which is tilted heavily towards replacing a larger fraction of pre-retirement income for low income workers than for higher income workers. Of course, the total net benefits may be slightly larger for some cohorts for higher income people reflecting the interaction of the larger intergenerational transfer and the larger tax payment which higher income individuals make.

Finally, in examining the base case we take a look at one other type of transfer as a percentage of benefits paid: disaggregating by industry of employment. The transfers as a percentage of benefits paid vary substantially across industries for a number of reasons: the different average income earned by workers of different industries; slightly different tax treatment in effective payroll tax rates because of differential proportions of workers above and below the taxable ceiling, etc. It is important to note that once again we observe the substantial net transfer

Table 4
Net Transfers by Income Class

| | | Income Class ^c | | | |
|-------------------------|---------------------------|---------------------------|------------------|--------------------|----------------|
| | | <u>< 6000</u> | <u>6000-8000</u> | <u>8000-10,800</u> | <u>10,800+</u> |
| Cohort 1 ^d : | Net Benefits ^a | 5,972 | 3,505 | 2,267 | -1,923 |
| | % Break ^b | 8.1 | 4.9 | 3.1 | -2.5 |
| Cohort 2: | Net Benefits ^b | 15,700 | 15,586 | 13,185 | 11,054 |
| | % Break | 26.7 | 23.4 | 20.4 | 16.3 |
| Cohort 3: | Net Benefits | 24,519 | 25,645 | 24,170 | 20,733 |
| | % Break | 50.1 | 46.7 | 44.5 | 35.1 |
| Cohort 4: | Net Benefits | 30,446 | 30,224 | 29,432 | 30,292 |
| | % Break | 69.2 | 64.3 | 61.3 | 57.8 |
| Cohort 5: | Net Benefits | 39,376 | 36,587 | 39,671 | 42,476 |
| | % Break | 87.6 | 80.0 | 81.0 | 75.3 |

N.B. Base case with inflation = 7%; productivity = 1.5%; discount rate = 3% net of inflation.

^aNet benefits = Benefits for average family in income class where both survive to retirement, in 1977 dollars, discounted to year of retirement, less taxes paid computed analogously.

^b% Break = Net benefits ÷ benefits paid.

^cIn 1977 dollars, for head of household only.

^dCohort 1 = 25-34;....Cohort 5 = 65+

Table 5

Transfers as Percent of Benefits Paid for Selected Industries by Cohort^a

| <u>Industry</u> | <u>Cohort</u> | | | | |
|----------------------------------|---------------|-------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 |
| Agriculture | -1.1 | 14.9 | 40.9 | 57.7 | 80.0 |
| Mining | -42.1 | -10.1 | 5.1 | 39.5 | N.A. |
| Construction | -37.9 | -18.5 | 11.3 | 43.8 | 70.2 |
| Manufacturing | -27.3 | -6.3 | 17.3 | 46.8 | 64.5 |
| Transportation/ Communication | -24.1 | -16.4 | 24.4 | 48.5 | 69.0 |
| Wholesale | -31.7 | -4.2 | 17.6 | 38.1 | 69.4 |
| Retail | -9.2 | 14.7 | 41.4 | 58.4 | 82.5 |
| Service | 3.8 | 21.4 | 41.5 | 62.8 | 83.5 |
| Banking Insurance Real Estate | -19.4 | 9.3 | 28.7 | 51.3 | 79.3 |

^aEstimate for average individual in each industry.

to current retirees, and expected net transfers to the oldest cohorts of workers, which will turn negative for the youngest cohorts of workers. These negative transfers occur even without considering the large tax increases necessary to finance the impending long-run deficit.

With these insights into the current Social Security situation in mind, we turn to a brief discussion of the alternative scenarios discussed above.

9. Disaggregated Estimates for Alternative Reform Possibilities

We have calculated, for a series of potential benefit and tax reforms, disaggregated estimates of average taxes paid per family, average benefits received per family, the average net benefits per family, the average net benefits as a percentage of taxes per family, the total taxes paid by and benefits to each cohort, and the transfers as a percentage of total benefits for each cohort.

The first alternative considered (in Table 6) is that labeled Trans. Recall that this eliminated all transfers and set up a situation where they could be treated separately under general revenues if so desired. In this scenario, we note the familiar pattern of the average taxes paid per family rising substantially as we move to younger and younger cohorts. We also note the same pattern for average benefits. However, now a different pattern emerges for the average net benefits received per family. In this case the average net benefits are virtually zero for all age cohorts. They differ slightly because we have not constrained the transfer to be zero for each cohort in each case, but have reduced the aggregate benefit payout each year to eliminate the transfer. Once again, the total taxes paid by each

Table 6

Trans

| <u>1977 \$</u> | <u>Cohort Age in 1977</u> | | | | | |
|--|---------------------------|--------------|--------------|--------------|--------------|---------------|
| | <u>65+</u> | <u>64-55</u> | <u>54-45</u> | <u>44-35</u> | <u>34-25</u> | <u><25</u> |
| Average Tax per Family | 7,058 | 18,345 | 33,882 | 53,326 | 73,843 | |
| Average Benefit per Family | 6,629 | 17,793 | 34,769 | 53,461 | 73,576 | |
| Average Net Benefit per Family | -429 | -552 | 886 | 134.9 | -267 | |
| Average Net Benefit as % Tax per Family | -6.07 | -3.01 | 2.62 | .25 | -.36 | |
| Total Taxes Paid by Cohort (billions) | 172.1 | 235.0 | 349.4 | 389.0 | 539.6 | 552 |
| Total Benefits Paid to Cohort (billions) | 172.1 | 235.0 | 350.4 | 389.0 | 502.5 | |
| Transfers as % of Total Benefits | .01 | -.01 | .29 | 0 | -7.39 | |

cohort and total benefits received by each cohort increase substantially as we go to younger and younger cohorts and net to approximately zero in the aggregate for each cohort.

Moving from Trans to Trans 80 in Table 7, which you recall involved a small tax cut as well as eliminating the transfers, yields a very similar pattern to that discussed above for Trans; indeed, the benefits received by the average family in each cohort are identical to the situation under Trans as are the total benefits paid out to each cohort. However, now the taxes differ somewhat to take account of the modest surplus that would result by eliminating all the transfers. In this case the average taxes per family are somewhat lower for each cohort, decreasing progressively more in percentage terms as we move to younger and younger age cohorts. The total taxes paid per cohort follow the same pattern.

Table 8 presents the same analysis under the base case assumptions for the scenario we label Ret to indicate retirement ages are raised by three years on average. As noted above in the discussion of the aggregate simulation comparing scenarios, Ret results in a situation where slightly higher taxes will be paid by the cohorts because they will be working slightly longer, but the benefits received while maintainable at the same annual level would be paid out over a somewhat shorter period.¹² Again, the aggregate benefit and the average benefits in each cohort will decline; we present estimates of benefits discounted to the original retirement age and note the decline in absolute and percentage terms. For example, the 25-34 year-old cohort loses about \$9500 or 13% of benefits. We note, for example, that the average net benefit per family declines from \$42,000 for current retirees to virtually zero for people at the age of about 40 to a larger negative number for people around the age of 30. The same is obviously true of average net benefits as a percentage of taxes per family. We note, however, that the total benefits received by each cohort will decline substantially with the later retirement. This decline becomes

Table 7
Trans 80

| <u>1977 \$</u> | Cohort-Age in 1977 | | | | | |
|---|--------------------|--------------|--------------|--------------|--------------|---------------|
| | <u>65+</u> | <u>64-55</u> | <u>54-45</u> | <u>44-35</u> | <u>34-25</u> | <u><25</u> |
| Average Tax per Family | 7045 | 17,818 | 31,368 | 47,729 | 64,409 | |
| Average Benefit per Family | 6629 | 17,793 | 34,770 | 53,461 | 73,577 | |
| Average Net Benefit per Family | -415 | -24.6 | 3,401 | 5,732 | 9,168 | |
| Average Net Benefit as % Tax per Family | -5.89 | -.14 | 10.84 | 12.0 | 14.23 | |
| Total Taxes Paid by Cohort | 171.6 | 228.8 | 324.6 | 349.0 | 470.0 | 459.7 |
| Total Benefits Paid to Cohort | 172.1 | 234.9 | 350.4 | 389.0 | 502.5 | |
| Transfer as % of Total Benefits | .25 | 2.60 | 7.36 | 10.28 | 6.46 | |

Table 8

Ret-Conditional on Current Life Expectancy

| <u>1977 \$</u> | <u>Cohort-Age in 1977</u> | | | | | |
|---|---------------------------|--------------|--------------|--------------|--------------|----------------|
| | <u>65+</u> | <u>64-55</u> | <u>54-45</u> | <u>44-35</u> | <u>34-25</u> | <u>< 25</u> |
| Average Tax per Family | 6,459 | 20,582 | 36,885 | 57,328 | 77,680 | |
| Average Benefit per Family | 45,208 | 43,319 | 51,087 | 59,284 | 64,079 | |
| Average % Reduction Relative to Base Case | 8.5 | 9.0 | 9.7 | 10.6 | 12.9 | |
| Average Net Benefit per Family | 38,750 | 22,737 | 14,202 | 1,956 | -13,601 | |
| Average Net Benefit as % Tax per Family | 600 | 109.04 | 38.50 | 3.41 | -17.51 | |
| Total Taxes Paid by Cohort (billions) | 172.1 | 236.6 | 355.7 | 382.3 | 508.4 | 712.9 |
| Total Benefits Paid to Cohort (billions) | 1282.2 | 525.7 | 465.4 | 395.3 | 396.7 | |
| Transfers as \$ of Total Benefits | 86.58 | 55.0 | 27.88 | 3.29 | -28.18 | |

progressively more important as we approach the younger age cohorts and reflects the importance of doing something about the long term deficit as soon as possible before enormous implicit obligations, which are currently unfunded, become cemented in place and we are forced to go to enormous tax increases to fund them.

This is vividly documented by comparing Ret with the two tax scenarios--Tax 80, a small tax increase now (above those already legislated to take effect in the future) which will totally close the deficit, and Tax 2030, a large tax increase to finance the baby boom generation's retirement at that date. Estimates for the latter two alternatives are contained in Tables 9 and 10, respectively. Recall these refer to the increases necessary to cover the OASI deficit only; the DI and HI deficit would add considerably to the totals. The average tax and average benefit paid and received per family look rather similar to the Ret case; the average net benefits differ somewhat. What is most important is the enormous difference in the total benefits received by each cohort as part of the Social Security System and the total Social Security taxes paid for each cohort. Under Trans, Trans 80 or Ret, benefits have been reduced in the Social Security System either directly or indirectly, and the total benefits paid to each cohort are much lower than if the implicit unfunded obligation involved is paid. The total benefits paid to younger cohorts differ enormously under the Tax 80 and Tax 2030 programs, as do the taxes paid. For example, while the total benefits paid to each cohort are identical under Tax 80 and Tax 2030, the time pattern and, hence, aggregate amount of taxes paid by each age cohort differ enormously. The aggregate taxes paid by current retirees and by workers aged 55 to 64 are virtually

Table 9

Tax 80

| <u>1977 \$</u> | Cohort-Age in 1977 | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|
| | <u>65+</u> | <u>64-55</u> | <u>54-45</u> | <u>44-35</u> | <u>34-25</u> |
| Average Tax per Family | 7,074 | 18,966 | 36,839 | 59,907 | 84,935 |
| Average Benefit per Family | 49,400 | 47,640 | 56,600 | 63,321 | 73,576 |
| Average Net Benefit per Family | 42,327 | 28,674 | 19,761 | 6,414 | -11,358 |
| Average Net Benefit as % Tax per Family | 598.3 | 151.2 | 53.64 | 10.71 | -13.37 |
| Total Taxes Paid by Cohort | 172 | 237 | 378 | 440 | 605 |
| Total Benefits Paid to Cohort ^a | 1297 | 614 | 592 | 485 | 516 |
| Transfers as % of Total Benefits | 87 | 61 | 36 | 9 | -17 |

^a These values differ slightly from the base case because a smaller sample size was used in this calculation.

Table 10

Tax 2030

| <u>1977 \$</u> | Cohort-Age in 1977 | | | | |
|--|--------------------|--------------|--------------|--------------|--------------|
| | <u>65+</u> | <u>64-55</u> | <u>54-45</u> | <u>44-35</u> | <u>34-25</u> |
| Average Tax per Family | 7,058 | 18,346 | 33,883 | 53,326 | 73,843 |
| Average Benefit per Family | 49,401 | 47,640 | 56,600 | 66,321 | 73,576 |
| Average Net Benefit per Family | 42,343 | 29,294 | 22,717 | 12,994 | -2.67 |
| Average Net Benefit as % Tax per Family | 600 | 159.68 | 67.05 | 24.37 | -.36 |
| Total Taxes Paid by Cohort | 167 | 230 | 349 | 393 | 526 |
| Total Benefits Paid to Cohort ^a | 1297 | 614 | 592 | 486 | 516 |
| Transfers as % of Total Benefits | 87 | 63 | 41 | 19 | -2 |

^a These values differ slightly from the base case because a smaller sample size was used in this calculation.

identical under these two scenarios. By the time we get to 35-44 year olds, Tax 80 has this cohort paying \$100 billion more in Social Security taxes than if we wait until after they retire to raise the tax rates in order to finance the unfunded deficit. For those age 25-34 the difference amounts to \$270 billion! This highlights the importance in choosing a time frame for dealing with the long-term funding problems of Social Security. Choosing to do nothing about this implies that we are trying to stick younger and younger generations with the bill. Will they be willing to finance future retirement payments at much higher tax rates than now exist?

In summary, we may note the variety of potential strategies, or avenues for disentangling the enormous problems that high and rising Social Security taxes and dual purpose unrationalized benefits create. We can simply say that we are going to raise taxes by even more than those legislated in the 1977 Amendments by an enormous amount, either currently (Tax 80), or in the distant future (Tax 2030) and try to shift around the burden of paying for these increased Social Security benefits which are not currently funded, or we can try to rationalize the benefit payments by separating out the transfer and annuity goals of the system, strengthening the earned entitlement function and having a separate transfer payment program funded by general revenues at whatever level is deemed socially desirable. Such alternatives exist under Trans and Trans 80, and are easily combined with a slight increase in the retirement age as suggested by Ret. These different scenarios suggest that there will not only be an enormous long-run impact on our overall economy depending upon which of these types of avenues we pursue, but that different groups in the population will be taxed and benefited quite differently depending upon which of these alternatives we

select. It is time for serious discussion of a fundamental refocusing of Social Security to rationalize the benefit structure and relieve the long-run burden of much higher payroll taxes implicit in the unfunded deficit. This paper is the first of our NBER Social Security simulation model projections. We hope it will stimulate such discussion as well as provide some quantitative estimates of the taxes, benefits and deficit implied by alternative potential solutions to the long-run Social Security funding problems.

Footnotes

- ¹ See A. Robertson, "Financial State of Social Security Programs after the Social Security Amendments of 1977," Social Security Bulletin, March 1978. The eight percentage point increase includes that estimated to fund the deficits in hospital and disability insurance as well as OASI.
- ² They might be defensible on other grounds.
- ³ This example is taken from D. Parsons and D. Munro, "Intergenerational Transfers in Social Security," The Crisis in Social Security, M. Boskin, ed., 1977.
- ⁴ Sensitivity of the "Base Case" estimates to various assumptions were also tested.
- ⁵ A fraction of each cohort that is in non-covered industries or who have insufficient quarters of coverage are considered to be ineligible for benefits. Wives who do not qualify on their own or on their husband's behalf receive no benefits. The retirement pattern can also be simulated by a retirement behavior equation, but these initial estimates are used to compare them with typical SSA assumptions.
- ⁶ The year of death of an individual was predicted using his or her age, race and sex. Individuals predicted to have died before reaching the age of 65 are excluded from the analysis. Year of death predictions used The U.S. Fact Book [1978] for all ages less than 65 and ages 65, 70, and 80. For ages not given, year of death was predicted interpolating from the 1969-71 death rates in: National Center for Health Statistics, U.S. Decennial Life Tables, Volume I, Number 1, Washington, D.C.: U.S. Government Printing Office, May 1975.
- ⁷ Benefits are increased by 17% for cohort 5 to adjust for widows.
- ⁸ The actual dependent variable used was the log of earnings. The independent variables include dummy variables for a Southern location, rural location, race, married, white collar, service collar, blue collar, industry, self-employed. Additional variable included were weeks worked and level of education.
- ⁹ Female labor force participation was assumed to keep the same age distribution as in 1975, but to slowly increase for each age group until 2005. The rate increases 12.5 percentage points for each age group by 2005. (This is based on assumptions of the 1977 Annual Report of the Trustees of the Social Security System.) Again, this is for comparison only. Future estimates will incorporate a separate female labor force participation equation.

¹¹ Assumptions:

- (1) In terms of cohort size, actual population statistics are used for individuals born from 1953 to 1977. Estimates of size for 1978 to 2050 were made assuming that birthrates decline from 1.7 to 1.65 in 1980 and then slowly increase to 2.1 in 2005.
- (2) Female labor force participation was assumed to keep the same age distribution as in 1975 but to slowly increase for each group until 2005. The rate increases 12.5 percentage points for each group until 2005.
- (3) Coverage by the Social Security System is assumed constant at 90%.
- (4) The percentage of women married is assumed constant at 93% based on 1975 data from the Statistical Abstract.
- (5) Unemployment is assumed constant at 5%.
- (6) The mortality rates for each age group remain constant.
- (7) The couple retires together at age 65.

All assumptions are based on the assumptions of the 1977 Annual Report of Trustees of the Social Security Administration.

- (8) The wage was adjusted to account for the fact that all income used in the estimates is below the taxable limit since the wage equation and the Social Security Match Tape data are used. The adjustment is based on taxable/total ratio in 1977.

¹² A RET-type reform could be phased in gradually, e.g., a month per year increase in the age of eligibility for benefits for sufficiently long to increase the retirement age to 67 or 68 before the "baby-boom" generation retires. This would avoid problems of changing the rules abruptly for those soon to retire or just retired.