A SOLUTION TO THE SOCIAL SECURITY CRISIS

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Abstract and Executive Summary

The Social Security crisis — the danger that the public pension system will not be able to pay the benefits that it has promised — has been discussed *ad nauseam*. But no one has yet offered a really satisfactory solution — one that ensures the indefinite maintenance of the popular, existing Social Security benefits without raising (or better yet, reducing) payroll contributions. With this contribution, we purport to show that such a solution exists, and that the moment the U.S.has a unique opportunity to pursue it. It consists of replacing the existing **pay-as-you-go** (Paygo) method of financing Social Security benefits with a **fully-funded** system.

The essential difference between the two methods is that in the first the mandated *saving* of the working population is used to pay the pensions and thus to finance the consumption of the retired. In the proposed alternative, instead. the contributions are entirely invested in earning assets which, at retirement are converted into a pension, and (once the system reaches maturity) are the only source of pension financing.

We show that, as a result of the difference in financing the funded system tends to outperform Paygo in many respects.

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1. The funded system is more cost effective in the sense that it requires a smaller contribution for a given set of benefits. This is because the accumulating assets are earning a return that reduces the required cash contribution. The size of possible saving depends on the relation between the rate of return on the accumulated assets relative to the "implicit" interest that can be offered by Paygo, which (as is well-known) is the rate of growth of (real) payrolls. Our proposal envisages that the mandated pension saving should be given the opportunity to earn a return commensurate with the overall return on capital. There seems little question that at present, and in the foreseeable future, this rate substantially exceeds the possible growth of payrolls, implying lower contributions with a funded system. Indeed, using the latest projections of payroll growth in the second half of the century, provided by the Social Security Administration (intermediate case) and a conservative of estimate of the return to capital (with risk adjustment) of around 5%, we find that, by the middle of the century the required OASDI (Old Age, Survivors and Disability Insurance) contribution with our funded system is around 7%. This is approximately 1/3 of the required Paygo contribution, which by the middle of next century is expected to approach 20%.

2. The funded system is more stable and financially resilient because under Paygo the required *contribution rate depends on the rate of growth of payrolls*. In particular if there is an unforseen decline in the growth of the nation's payroll, the system becomes insolvent in that it cannot pay the promised benefits, or only at the cost of raising the payroll tax rate or cutting the benefits. For example, if payroll growth declines because population growth slows down, then there will be fewer young workers *contributing* to, relative to the number of older retired people *collecting* from, Social Security. Receipts will fall short of the benefits promised. The same problem will arise if productivity growth slows down. The crisis that threatens our Social Security system springs entirely from the recent and prospective decline in the growth of payrolls (and not from a presumed inefficency of public management). With a fully-funded system, instead, the payroll tax that

must be levied is unaffected by changes in demographic structure, because the pension is not paid by the contributions of the younger workers but by the capital accumulated by the pensioneer.

3. The funded system in contrast to Paygo results in a large accumulation of assets and thus makes a valuable contribution to national Saving, the stock of productive Capital and national Income.

Similarly, it depends only to a minor degree on changes in productivity growth.[1] Its main determinant, instead, is the (long run average) return on its investment, but even variations in this variable, within historically realistic limits, would not require drastic changes in the contribution rate.

In light of the advantages of funding it is not surprising that a number of proposals have been set forth for funding Public Pension systems. Chile, followed by several South American countries has introduced reforms leading to total funding. In the US the best known approaches aim at a mixed system with only partial funding (e.g., Governor George W. Bush, Congressmen Archer and Shaw, Professor Feldstein). But all of these proposals differ profoundly from ours because they advocate redirecting (at least in part) the compulsory contributions to the Social Security system to *individually owned and managed accounts*, which at retirement are annuitized into a pension. Such an approach would radically alter the very nature of the existing system from one of "defined benefits" to one of "defined contributions" and hence of *highly uncertain* pensions. Under the current system, Social Security benefits are predictably based on a participant's life contributions. If instead benefits depend on the outcome of one's personal portfolio, the pension that one may expect on retirement for the rest of one's life becomes a gamble. It will be at the mercy of your luck in choosing your portfolio and the time for your retirement – whether it comes at the height of a bull or bear

[1] Changes to these variables will impact the transition as discussed later.

market. Furthermore, individuals with identical contributions, may fair very differently.

In addition, the individual portfolio approach suffers from several other serious shortcomings (sect. 5). We urge Americans to reject any form of individual portfolios which implies a betrayal of the very spirit of the present system, and to demand that any reform must provide Defined Benefits.

But to offer defined (real) benefits, a pension system must be able to count on a fixed (real) rate of return common to all participants. Obviously this condition cannot be satisfied with individual portfolios. We propose therefore that all participants' contributions be invested in one *common* portfolio. This brings us to a hotly debated issue: how to choose that portfolio? We suggest a simple, practical answer: invest all the assets in a highly diversified portfolio consisting of a share of the total US "market portfolio". Such a portfolio is known to have efficiency properties, can be inexpensive to manage and, what is most important, it leaves no portfolio management discretion to politicians or bureaucrats. Note in particular, that the recommended portfolio would include stocks and bonds in the market proportions, which is currently around 2/3 in stocks and 1/3 in bonds.

To insure that the common real return is fixed, we propose to make use of a recently developed financial contract, namely a *swap* between Social Security and the Treasury. Under this contract, the pension system would exchange the return derived from its market portfolio for a payment by the Treasury of a fixed real return probably on the order of 5%. [This figure is appreciably lower than the expected market return plus the additional Treasury tax revenue resulting from the plan (sect.4).]

How do we move from pay-as-you-go to a fully funded system? This basically requires funding the unfunded liabilities of the existing pay-as-you-go system. It is widely believed that this operation would impose an intolerably

heavy burden on the transition generation which would be required to double its contribution. We show, with the help of a number of simulations, that this view generally exaggerates the transition cost and that the U.S. in particular is in the lucky position of being able to provide all of the additional resources needed to fund the system, without ever raising payroll contributions. The sources of funds are: 1) the reserves accumulating in the Social Security Trust Fund from past surpluses; 2) the further surpluses accumulating till the middle of the decade; 3) a portion of the expected budget surplus (which has already been promised to Social Security by the President); and 4) an investment policy which insures a reasonably high and yet safe return.

These four sources are sufficient to carry out the transition *without ever raising the required contributions*, though at the cost of a rather slow transition. The time that is required to *complete* the transition is long – many decades. Actually it cannot be measured precisely because we can demonstrate that there are multiple possible transition paths that involve a trade-off between the timing of reductions in contributions and the length of time to final equilibrium (see simulation in Appendix). But we can show that, with our approach, there are feasible paths for which, at least from the middle of the century on our contribution path is lower (and progressively so) than that required under the proposal of the Administration, or any other major proposal of which we are aware.

In conclusion, we propose a permanent solution for Social Security resting on two pillars. The first is a fully-funded system, which permits a dramatic reduction in the required payroll tax. It also improves the resiliency of the system to changes in payroll growth, and contributes to capital formation. The second is the current structure of defined benefits. It is secured by investing the pension accumulation in a single portfolio – representing a share of America's wealth and reflecting its economic performance – and by swapping the return of that portfolio for a sure real rate guaranteed by the U.S. government.

The approach we advocate clearly shifts to the government the risk that the market return deviates from that guaranteed to Social Security. But we contend that the US government is in a position to absorb this risk because of its size and indefinite life and the consequent ability to spread the risk of a single cohort of workers over a large number of cohorts and that it should be prepared to underwrite that risk to give to older Americans the peace of mind that they deserve.

We conclude with a plea that the lucky occurrence of a large surplus *not* be used to cut taxes or increase current spending, or to temporarily fix the inefficient, unreliable, poorly designed Paygo system. Instead, we propose using the surplus in a productive way, in the best interest of the country, both for the present and especially for the future, by making the transition to the more efficient and reliable funded system. And let us rememeber that while the Social Security bomb has a long fuse, the remedies suggested here have a fuse at least as long. The time for a decision is right now!

1. Overview of contributions required under PAYGO vs. a funded system

We begin by reviewing the forces that determine the required contribution rate, once the transition is complete, for each of the two alternative financing approaches PAYGO and FULL FUNDING. This relationship depends on a number of parameters. Some of these are "exogenous", *i.e.*, outside the direct control of policy makers, while others primarily reflect decisions of the policy makers.[2]

In the first group, the most important are:

i) the rate of growth of real income (y), and its two components (items ii and iii);

ii) the growth of the labor force (n);

iii) productivity growth (q);

iv) longevity (e); and

v) the rates of return on various financial assets, and their volatility.

The policy determined parameters include:

i) the standard retirement age, which together with longevity determines the average duration of pensions;

ii) the portfolio in which the accumulated capital of the fund is invested (important mostly for a funded scheme since under PAYGO there is in principle no accumulated capital to invest);

iii) the so-called "rate of replacement", or the ratio of the pension to some measure of income earned while working and contributing. The specification of the replacement rate involves detailing what measure of income should be used (*e.g.*, terminal versus lifetime average) and how it is related to the years of contribution.

The effect of the major parameters on the required contribution rate under different financing schemes is illustrated in Tables 1A and 1B which also serve to support our contention that, under realistic assumptions, a funded system is far more efficient economically as well as less "at risk" than PAYGO.[3]

The calculations in the tables assume the following parameters: 40 years of contributions and a replacement rate of 50% of life average income (if the replacement rate were different, all the contribution rates reported would change in proportion for a life annuity). As for average length of life after retirement, we show the implications of two alternative assumptions. In the left portion of the tables, we assume life expectancy of 16 years, which happens to be the level anticipated around the middle of next century in the report of the OASDI trustees (the Report), under the so-called "low cost" assumptions. On the right hand side, life expectancy is assumed to be 18 years, corresponding to the "intermediate cost" assumptions. *It is further assumed that the assets of the fund are invested in the 'indexed portfolio' of all marketable securities, and swapped for the indicated real interest rate.*

[2] While the discussion is largely in the context of pensions, the same principles can be applied to a combination of pensions and disability.

[3] We have also examined the impact of indexing pensions to wage growth and the contributions to funded schemes, especially cash balance type schemes, are relatively stable to this form of indexation.

1.1 The PAYGO scheme

Table 1A shows an estimate of the ratio of current pensions to contemporaneous (taxable) wages, or the so-called "cost ratio for pensions" of the Report, for different parameter values.[4] However, under a PAYGO financing scheme, since pension outlays must, by and large, be paid out of current contributions, the cost ratio also measures the ratio of required contributions to wages or the "equilibrium contribution rate".

The main thing to note in Table 1A is the extreme sensitivity of the contribution rate to growth parameters of population (n) and productivity (q), and hence their sum, (y). The required contribution rate declines as population growth (n), increases, through the well-known "age pyramid" effect. The lower n, the higher the ratio of retired beneficiaries to active workers that must support them with their contribution, and hence the higher the required contribution rate and the quantitative effect is impressive. The effect of productivity growth is more complex, but it works in the same direction and is quantitatively very similar. Thus the required contribution depends essentially on the sum: (n + q = y). It is seen from the Table that a decline in (y) by two percentage points from two to zero requires a rise in contribution of some *nine percentage points* from 11% to 20%. But for many of the countries in Europe (*e.g.*, Italy) the replacement rate is up to 80% of *terminal income*, which means around 100% of average income, the figures in the table must be doubled. In particular, with a productivity growth closer to 1.5%, and little population growth the table suggests an equilibrium contribution of 20-25%, which is close to what SS levies actually are in those countries.

In short, with PAYGO financing, the required contribution is much too susceptible to small and very plausible changes in prospective growth and

[4] The disability insurance cost ratio grows to 2.6% of payrolls over time.

therefore *cannot provide the basis for a stable system* that is not continuously threatened by major crises, such as the current one.

1.2 The funded scheme

Consider next Table 1B that reports the contribution needed under a funded system. A comparison with Table 1A reveals in striking fashion the much greater efficiency of the funded system in the sense of a much smaller required contribution for given benefits. As explained earlier, the reason for the difference is that, in the funded scheme, a large portion of the pensions is paid not from the cash contribution, but by the interest on the accumulated wealth. Take for instance the case most favorable to the funded system in Table 1: a zero growth of income, 6% rate of return on investment and 18 years retirement. Here the PAYGO contribution is 22.5% versus only 3.5% for the funded system! Such a difference may seem impossibly large: how can the funded system deliver pension amounting to 22.5% of current wages with a contribution 19 percentage points lower? The answer, of course, is to be found in the accumulation of earning assets under the funded scheme. By the time the funded system reaches maturity, the Trust Fund holds assets amounting to about 3.2 times wages, the return on which at 6% is sufficient to fill the gap.

To be sure, the above illustration is rather extreme, but the difference remains large even for more realistic cases. For instance, let us consider the long run growth assumptions for the U.S. corresponding to the so-called “intermediate cost” projections. The corresponding contribution required under PAYGO is shown in Table 1 by the shaded entry in the right side of Table 1A, namely17.2% (which is the 1999 estimate of the OAS cost ratio estimate for pensions by the third quarter of this century). We see from the corresponding column of Table 1B that the required contribution for the funded system is less than 4% for a rate of return of 6%, and for a rate of return of 5% it is just over 5% or more than 2/3 lower.

Even with a return as low as 4% (roughly the current real rate on U.S. Treasury Inflation-proof bonds) the equilibrium contribution is but 7% or 60% lower.

Tables 1A and 1B also bring out several other aspects in which a funded system dominates PAYGO financing.[5] The first is that, in a funded system, the required contribution is not only independent of (n), but also hardly affected by (q), and then in the direction opposite than under PAYGO: namely it declines if (q) declines, (because of the decline in the "adjusted" rate of return). The second is that, surprisingly, even changes in life expectancy (e) have only a small impact. A rise in (e) from 16 to 18 years, which is a fairly large one, requires an increase in contribution of only around 20 basis points, while under PAYGO the increase is over 200 basis points. Thus, in practice, the required contribution depends only on the rate of return. However, even for changes in the rate of return, the change in contribution for say a 200 basis decline from 6% to 4% requires a change in contribution of the order of 300 basis points, much smaller than the nearly 800 basis points change required under PAYGO for a 2 percentage point decline in (y).

While the discussion above has been focused largely on pensions, in the scheme we have proposed we plan to use the benefits (both pensions and disability) of the current system and financed through contributions and a net rate of return (where the net is impacted by productivity and labor force growth). Therefore, the higher the growth of productivity and labor force, the lower the cost ratio, but also the lower the net rate of return. While the steady state assumptions of the growth of these two parameters are low, this could potentially pose problems during the transition if growth is higher than estimated. The net effect would be that the steady state contribution will need to be raised, but it is still likely to be significantly lower than that under PAYGO.

To summarize, the results of this section provide the evidence for the claim set out in the introduction that on grounds of cost-to-benefit ratio, of flexibility and

of stability of required contributions with respect to likely changes in exogenous parameters, the fully funded system is vastly superior to PAYGO.

2. The transition from pay-as-you-go to a fully funded system

2.1 Description of the basic transition mechanism

The centerpiece of our plan to negotiate the transition from pay-as-you-go to a fully-funded system is the creation of a new fund (NF), which like SS is financed by *mandated contributions*, and will offer *defined benefits*, but which will be *fully funded.* The contribution will be established so that when the fund reaches maturity it will be able to pay benefits at the established rate (e.g., to provide a 50% replacement rate at age 65). The fund reaches maturity when all the participants have paid the required contribution through their entire life. Clearly the required contribution will depend on the rate of return on assets and other relevant parameters reviewed in section 1.2.

The NF will pay pensions from the very beginning, *following the rules appropriate to a funded system* – i.e., will pay pensions to those who reach the retirement age on the basis of what they have actually contributed to NF. The amount of these pensions will be established by annuitizing the participant's credit balance at the date of retirement using the fixed rate of return. Note the difference with the rules of a PAYGO system, where on retirement pensions are paid from the beginning also to people who have never contributed, like those already retired, and to older people that made only partial contributions. In the NF, only those who have had the opportunity of making the full required years of contribution will, on retirement, be entitled to the full pension from NF.

However, the NF pensions *will not actually be paid to the pensioners.* Instead, *the aggregate flow of pensions due in a given period* will be *transferred in*

[5] See also Feldstein (1997).

bulk to SS. SS will continue to exist during the transition period and its assignment will consist of three functions: i) to continue to pay the pensions according to the existing rule (or some modification that might be later decided, unrelated to our reform) and also to pay the fixed conribution to the NF; ii) to receive *the flow from NF*; and iii) to establish and collect dues as needed to cover the difference between the expenditures under i) and the flow received from NF. Since the amount under i) is fixed by the existing rules (called Current Law), the flow from the NF reduces the amount to be raised by SS making it possible to reduce contributions. It will be convenient to assume initially, that in the absence of a reform the SS budget would be balanced, i.e., that the contributions received equal the cost ratio (at least for some time). It follows that, in the beginning, the SS obligation to transfer to NF the fixed contribution will result, as is well known, in a current account deficit that has to be made up somehow. By whom and how this supplement will be paid is examined below.

The size of the contribution must *eventually* reach a permanent "level" determined by the mandated level of benefits relative contributions and the return on the NF investment (see 2. below). But initially, it could be chosen lower in light of a trade-off between considerations of intergenerational equity calling for a low start – as old people will have no advantage from the reform – and the recognition that a lower initial contribution will tend to result in a longer transition.

The flow of transfers from NF to SS will, initially, be tiny as only few participants will have reached the retirement age and they will have very small balances, having contributed to the fund only for a short time. However, the flow will grow rapidly, because the number of people retiring will grow for a number of years related to life expectancy, and because those retiring will have progressively larger balances, as they will have contributed longer to the fund.

The key idea of our solution is that the NF flow of pensions will keep growing until the NF reaches "maturity". At that time, provided the permanent contribution

rate has been set at the appropriate level consistent with the rate of return and demographics, the flow of pensions generated by NF will equal the flow of benefits that are to be paid by the old PAYGO system, which is the cost ratio. At this point, the role of Social Security will be reduced to dispersing the pensions financed by the NF pension scheme, and to collect from the participants the amount of the fixed contribution rate due to NF. We can expect that amount to be vastly lower than the Cost Ratio, as is confirmed below.

Note that the time it takes for the NF to reach maturity, permitting the full abatement of the contribution by possibly as much as 2/3 is substantial, at least as long as the length of the standard contributive life plus the length of retirement – something on the order of some 60 years. But we must stress that a cut in contributions can begin quite a bit earlier.

In the next sections, we will illustrate the application of our basic approach, through two sets of simulations. The first is purely hypothetical and designed to facilitate an understanding of the working of the transition mechanism, and also to bring to light some useful generalizations of the approach. The second instead deals explicitly with the "intermediate" scenario that the SSA projects the US will face in the next century.

3. The transition path – Some simulations

3.1 A hypothetical stationary economy

The simulation, presented in Table 2 and Figure 1 assumes zero values for both (n) and (q) (population and productivity). The other parameters have the same values as in Tables 1A and 1B[6], except that life expectancy is taken as 15 years. Under these assumptions, the cost ratio, and hence the required contribution for PAYGO, is 18.75%

[6] This includes working life of 40 years and 50% replacement on life-average income.

(15/40 x 0.5).[7] For the funded system, we assume a rate of return of 6% and the *permanent* required contribution is 3.13%. This is the "equilibrium" contribution rate, if paid by the all active (and by the retired when they were active), and supplemented by the return on its assets, would enable the fund to cover the cost ratio of 18.75%.

The table gives a year-by-year account of the relevant variables that are expressed as a percentage of taxable payroll. However, for present purposes, we believe that the essential characteristic of the transition process under our proposal can be conveniently understood by taking a close look at Figure 1 and its main series as follows:

i) the "cost ratio" or the pensions due relative to wages that, by assumption, is fixed at 18.75%, and is represented by the horizontal curve at that height;

ii) the interest on Trust Funds curve, represented by the line starting at zero and terminating in the vicinity of the cost ratio at 15.6%, shows the path of the flow of interest provided by the TF (the key variable in our approach). As expected, it starts out negligibly small, gathers momentum for the first 45 years, but then slows down as the system approaches maturity, and the flow of pensions approaches the cost ratio;

iii) the path of the required contribution rate to the new pension system, represented by the steadily decreasing curve so labeled, and which is the other key variable. The required contribution (as a percentage of wages) consists clearly of the pensions to be paid, or cost ratio (18.75%), plus the transition cost, *minus* the amount of reductions that can be made over time. Since the first two items are fixed, the rise in the interest on TF permits the reduction of the levies raised by Social Security. In the initial stretch (14 years) the transition cost is 2%. So the total contribution starts at 20.75% or 2% above the PAYGO rate, but returns to 18.75% by year 2015. By the year 2025, the needed contribution falls below that of the PAYGO system as we can cut 1.25% every 5 years until 2075 when a larger cut can be made. The interest flow "crowd out", as it were, the required contribution rate until, at maturity, it is reduced to the equilibrium rate of 3.13%, compared with the PAYGO rate of 18.75%. This huge difference is made possible by the large buildup of assets in the TF, which is shown in col. (8) of Table 2, reaching 2.6 times wages, and the return thereof in

[7] Fifteen retirees paid 50 cents on the dollar by forty active participants implies an 18.75% contribution from the active taxable payroll.

col. (5). By maturity the interest flow amounts to 15.6% per year which, together with the contribution rate of 3.1% covers the 18.75% cost ratio.

But, as was pointed out earlier, the transition to the more efficient system involves a cost - that of funding the unfunded liabilities of PAYGO - that requires initially raising the contribution to the system. We can measure the transition cost by the amount of such added contributions: they are represented in the graph by the difference between the required contributions and the PAYGO cost ratio. This difference is also shown by the curve labeled "transition cost" in the lower left-hand corner. It is seen that the cost starts at 2% and stopped by year 15. This cost of transition from a permanent 18.75% to 3.1% per year contribution appears surprisingly small, with our approach, less than 2% of payrolls per year, on the average, for some 15 years. This is in sharp contrast with the common perception that the transition cohorts have to pay, through their life, a double contribution: one to the old SS and one to the new funded system.

The next question is: how might that cost be allocated? There are many ways to spread the cost between different groups. For instance, one could place the burden on the current workers by increasing their contribution rate, to the level indicated by the "required contribution" curve, or on the current retirees by lowering pensions temporarily. Either action or any combination of the two would reduce consumption and increase saving. Alternatively, the government could absorb the transition cost, and the employees' contributions would remain constant until the transition cost ceases, and then declines thereafter as shown by column (3). The government contribution, in turn, could be financed by increased public saving through higher taxes or lower government consumption, or finally by borrowing and increasing government debt, with the burden falling on future generations. It must be understood however that the latter method would be counterproductive, for the increase in debt would offset the new saving of the system, thus negating one of the important benefits of funding, namely that of increasing national saving and capital.

3.2 The Existence of Alternative Paths to a Fully Funded Equilibrium

We have seen that, at maturity, the NF is able to pay pensions equal to the Cost Ratio and that these outlays are covered by receipts equal to the fixed contribution, say c*, plus the income it obtains from its (equilibrium) assets, rA* (where c* and A* are measured as ratios to aggregate wages). Thus in the steady state the following relation holds:

$$c^* + rA^* = CR$$

which implies that in the steady state assets must have a unique equilibrium value given by

$$A^* = (CR - c^*)/ r$$

(Thus, for the simulation of Table 2, the equilibrium asset/wage ratio is (18.75-3.13)/0.06= 2.6).[8]

An important implication is that whenever the system has accumulated an amount of net assets/wages equal to the equilibrium ratio, then it has reached a position of long run equilibrium, (equivalent to maturity) in the sense that it can pay the benefit embodied in the cost ratio, with a permanent required contribution equal to the equilibrium contribution rate. In the above example, if the system manages somehow to accumulate a net-worth-wage ratio of 2.6, then it can pay the 18.75% benefit ratio, with a contribution rate of but 3.13%, (instead of 18.75% under PAYGO) because the difference is covered by the return on the assets accumulated. This conclusion is important because it is intuitively clear that there must be many possible ways of accumulating the equilibrium wealth-wage ratio. In other words, while our simulation shows one possible path resulting in the accumulation of the equilibrium wealth, there must be many other paths arriving at that result. Clearly this observation has important implications in terms of broadening the paths accessible by our approach. We cannot afford to pursue this subject here, but for the sake of concreteness, we should like to suggest a simple exercise.

In the example of Table 2, the reduction in contribution does not become effective until 25 years after the reform is initiated; but after 30 years the decline is fairly rapid, some

1.25% every 5 years initially and reaching 2.7% in 2070. This clearly raises question of intergenerational equity. Could one 'smooth' the gains from the reform by assuring some gains for earlier generations while reducing those of some later generations? For instance, we may want to begin cutting the contribution, say 5 years earlier; in Figure 1 this would mean that the contribution curve is one percentage point below the original one and must presumably remain below at least till the year 2025. This can be seen to be perfectly possible, but on the condition that, at some later point in time, the alternate path crosses the old path and remains, at least for a while, above it. The reason can be explained (roughly) by the consideration that the height of the contribution line at any point is a major determinant of the slope of the path of wealth accumulation. Hence, in the period when the contribution is lower, wealth accumulates more slowly, falling below the standard path. Therefore, in order for the net asset ratio to reach the equilibrium level, it must at some later date catch up by growing faster, which means a contribution rate above the standard. It is in principle even possible to maintain the alternate path below (or at least never above) the equilibrium path until the terminal year of the standard version (2080). However, in this case the asset ratio will be too low and therefore the contribution rate will have to remain for a while above the long run equilibrium value of 3.13%. The principle should be clear; one can improve the lot of the older generations, but only at the expense of the younger ones (who however are privileged by the standard solution).

3.3 Merging two funds into one

Up to this point we have relied on the two funds approach: the old Social Security and the New Fund, because we believe that this formulation is helpful to bring out the fundamental logic of our approach. But having done so we may now ask whether the two funds structure is in fact essential to the proposed reform. It is easily shown (with the help of the results of the last section) that the answer is no - that the result can be achieved just as well, and in fact more conveniently, by relying on a single fund – let us continue to call it (the new) Social Security. The validity of the proposition above can be readily verified by writing down in column form, for each of the two hypothetical institutions, a use and source of funds

[8] With growth, one would need to adjust the denominator, thereby leading to a higher ratio.

statement for any year, using the columns of Table 2. One must however add to each fund statement the balancing entry "surplus", say on the user side (so that a positive surplus means an excess of sources over uses). We can next consolidate the two by carrying out this consolidation for say Table 2 one finds the following simple result: for any year System surplus = NF surplus + SS surplus = Total Contributions to the pension system (i. e. private plus public, if any) + return on Assets – Cost Ratio where Assets means the cumulant of the surpluses capitalized at the fixed rate. Since at any point of time the Assets are a historical given, and the Cost ratio is similarly a constant or an exogenously given target, the system surplus is an increasing function of the Total Contribution.

Now we know from the last section that to complete the transition it is sufficient that the Assets reach the critical level determined by the Cost Ratio, the rate of return, and the long run equilibrium contribution that characterizes the steady state, and which can be readily calculated independently whether there are two funds or just one.

We can conclude therefore that, at least as long as the Cost Ratio is constant, our approach will lead to a termination of the transition on condition that I), at the beginning of the reform the total contribution exceeds the Cost Ratio, so as to generate an initial surplus and, ii) thereafter keeping the contribution rate high enough to result in a (sufficiently) positive surplus to increase the Assets toward equilibrium. Clearly there will be many possible eligible paths of the contribution, all monotonically declining (at least in the large) but of different shapes and duration. In general, the lower the contribution path, the longer it will take to complete the transition. The initial gap between contribution and Cost Ratio can be created by increasing participants' contributions or through a government subsidy as explained earlier.

This conclusion unfortunately does not mean that our approach guarantees a smooth transition just by the choice of an appropriate monotonically declining contribution. It does so provided the Cost Ratio is constant (or declining), but not

necessarily if the cost ratio is expected to rise significantly above current level, threatening the insolvency of the PAYGO system. But this is precisely what is happening in the United States and to some extent in many other countries on PAYGO. The simulation presented in the next section is therefore of special interest. It shows that our approach works very effectively for the United States, generating a gradual but full transition with participants' contributions initially constant and then monotonically declining, though this outcome partly reflects a set of favorable circumstances unique to the U.S.

3.4 The transition for the U.S. "intermediate cost" case

3.4 - i) Basic Assumptions

Table 3 and Figure 2 report the result of the simulation. We rely on the more convenient one-fund approach and include in the Cost Ratio the whole OASDI, i.e., inclusive of disability insurance. We highlight the key issues in this section and leave the more detailed evaluation of the table and figures to the Appendix. We also provide an alternative simulation in the Appendix where contributions are cut earlier and more slowly, but where a different equilibrium is reached in 2075.

In the simulation reported here, the fictitious values of the parameters of the first simulation are replaced with those estimated by the Social Security Administration for the "intermediate projection" and assume a more conservative estimate of return of 5.2% during the transition. We address the appropriateness of this return assumption in Section 4. Finally, we assume that Congress will adopt the President's proposal in the Mid-Session Review of the Budget and transfer the Administration's proposed share of on-budget surpluses to Social Security.

Unfortunately, the Administration's analysis suggests that, if the current contribution rate is maintained, with PAYGO, this large infusion can only postpone the date of the exhaustion of the Trust Fund to the end of the 2040's. By then, the OASDI contribution rate

under PAYGO is expected to increase a bit to about 12.4% and the cost ratio is expected to amount to 18%. Hence, if we retain the PAYGO system for the promised benefits, after the middle of the next century, the contribution would have to jump dramatically from 12.4% to 19.5%. Alternatively, one would have to enforce a 1/3 decline in the benefits (reneging on past promises) or some combination of these two unsavory measures. In short, the Administration's plan *does not provide a long-term solution* to the Social Security crisis, in contrast to our plan, which not only ensures a permanent solution, but also offers a drastic decline in contributions.

3.4 - ii) A bird's eye view of the contribution path for alternative proposed approaches

The above considerations are illustrated in Figure 2, which provides a convenient bird's eye view of what can be achieved through our reform, in comparison with some main alternatives. In the figure, the line Cost Ratio shows the path of contributions that would have to be levied under PAYGO financing, in the absence of the Trust Fund and the pledged government contributions.

The 'wavy' curve, labeled "Administration" shows the behavior of contributions needed to maintain solvency under the Administration's program. Up to 2055, the contributions are kept at the currently forecasted level of receipts. This level is initially higher than the cost ratio, permitting a further growth of the Trust Funds, spurred by the government contribution promised by the Clinton program. The cost ratio rises quickly, because of the slowing down of labor force and productivity growth. Furthermore, with the contribution rate stable, there is a continuing reduction of the surplus that eventually turns into a growing deficit. For a while, that deficit can be covered by drawing down the Trust Fund. But by around 2055, the Trust Fund is exhausted and to keep the system solvent, as indicated above, some combination of raising drastically contributions and/or slashing deeply benefits would need to be enforced. In Figure 2, we demonstrate the impact of the former choice.

The third curve, shown by the solid line, represents one possible path of the contribution that is achievable with our approach: Our path coincides with that of the Administration until the year 2057.[9] By that date, the SS Trust Funds have grown vigorously from approximately 20% of wages to approximately 280%, thanks to the SS surplus and the government contribution through 2015. So, in 2058, it is possible to cut the contribution to some 7.5%. This approach of not cutting before 2058 allows the equilibrium contribution to reach the steady state level of approximately 6.2%, by the mid 2070's.

Notice that between 2056-2058, the total contribution under our plan is 12.4%, just at the time when the Administration's plan calls for a 50% rise in contributions to 18.4%. Furthermore, under the Clinton program the contribution rate continues to rise past 18%; whereas under our plan we are able to drastically cut the contribution to the steady state level of 6.2% in 2075. The Appendix and Figure 3 provide an alternative simulation where we start cutting in 2040 by 1.2% every decade to demonstrate the dynamics of our plan under alternative scenarios.

Figure 2 is helpful in countering certain criticisms that have been raised against the implementation of our approach. Specifically it has been objected that, even granting that our program is capable of insuring a transition to a fully funded system, there is no valid reason to jettison the existing PAYGO system and undertake the rather extensive reforms that we are proposing. One justification for this view is that there is no real short-term crisis in sight if we keep the current structure. After all, with the help of the government intended subsidization, and the small investment of the Trust Fund in equity, we can go past the middle of the next century without raising contributions or cutting benefits. Are we not making a big fuss for what might happen after most of the people now alive will be dead?

This argument is really untenable. It is true that we normally do not take current measures for things that might occur in the far future; but this is because there typically is great uncertainty about the implications of the occurrence and about the effectiveness of

[9] By this point DI is running a deficit. In simulations not reported here for the OAS only we could have cut contributions earlier.

measures taken far in advance. But in the present instance, because of the predictable nature of demographic development and the sluggishness of productivity growth, we can be pretty sure that if we irresponsibly retain the current PAYGO system, by the middle of the next century pension payments much in excess of the current contribution will have exhausted accumulated reserves and plunge the SS in a financial quandary, not resolvable without a huge rise in contribution and or cut of benefits. Furthermore, as our simulations show, the measures needed to avoid that trauma must be started a long time earlier, like right now. Failure to do so would be irresponsible.

A second argument is based on the consideration that the deficit of the current system is not really that serious. The SSA has calculated that up to 2075 the receipts are short of promised benefits by only some 2% of payrolls: thus we could solve the problem for at least the next ¾ of a century, while maintaining PAYGO by opting for an immediate rise in the OAS contribution from the current 11 to say 13% (which would make the combined OASDI contribution approximately 15%). But this approach-call it the M solution-produces a path of contributions that is dramatically worse than ours as can be seen from Figure 2. In this figure, the M contribution path is represented by a horizontal line at a height of 15%. It is seen that contributions are uniformly 1.5% higher for the first 40 years and that the difference grows steadily thereafter, reaching at least 6 percentage points by the mid-seventies and even more thereafter. A detailed year-by-year account of the simulation is provided in Table 3 and discussed in the Appendix along with the results of an alternative simulation with a different contribution path.

4. Issues relating to the choice of the rate of return

In this section, we take up issues relating to the management of assets and the choice of the rate of return. We examine whether the gross level of 5.2% real is reasonable. Next, we examine whether funding outperforms PAYGO because of the selected rate of return. Finally, we evaluate what is the potential impact on the rate of return from the substantial increase in wealth under funding

4.1 Managing the Trust Fund Portfolio

As we have indicated earlier, we recommend that the entire Trust Fund (TF) be invested in a single benchmark portfolio consisting, in principle, of an appropriate fraction of the value of every traded security. But even this porfolio, though it leaves no discretion about composition, requires some management because of possible changes in the composition of the Benchmark. This very limited management could be done, at a very small cost, in-house, under the supervision of a prestigious board; but it could as well be entrusted to a number of private managers for a fee established through competitive bidding.

The fact that the management of the portfolio leaves no room for discretion has obvious advantages eliminating the danger of political manipulations. But it also has a drawback, namely, that the managers will be following the market passively and therefore their decisions will not reflect their views about the true value of companies in their portfolio. It follows that as the TF grows to be a larger share of the market, the valuation function will be left to the owners of a declining fraction of capital, which must be regarded as an undesirable development. The problem is even more troublesome if one considers the issue of whether TF or its managers should be entitled to vote their shares. Considering the dangers of political manipulation, the answer would seem to be negative; but again, this raises the issue that it will become easier to secure a controlling majority of the Board.

We would like therefore to submit for consideration an alternative approach, which is inspired by the very recent launching of a new type of instrument - the so-called I shares.

Suppose you have chosen n managers to manage each 1/n of the portfolio. Imagine next that, instead of ordering them to hold the benchmark portfolio, you offer them a contract under which they commit themselves to give the fund the exact return that it would obtain holding the benchmark, securing this commitment with adequate guarantees. The fund managers should find this contract more advantageous because they have the option of total hedging by actually choosing to hold the benchmark. But, at the same time, they are free to choose some other portfolio which they regard as promising a higher return, though, of course that involves taking some risk. But that means that each manager will have an incentive to use his information to hold the most promising portfolio, which is precisely what happens today with private managers of institutional or private money, except that at present they may not have an option to hedge completely. In short, this type of contract can insure for the TF the benchmark return, while at the same time opening the possibility that the market may reflect the information and expectations of all investors without excluding those whose portfolio is strictly benchmarked.

4.2 Description of the swap contract

In our "miraculous" simulations, we have used as illustration rates of return of 6% and 5.2%. It has been suggested that our apparent ability to solve the problem permanently, while substantially reducing contribution rates, is due entirely to the fact that we use unrealistic assumptions about the rate of return.

It is, of course, true that even our 5.2% rate is much higher than that assumed in the Administration's plan that envisages a gradual investment of the TF in equities, but with a maximum limit of 16%. As a result, even though that plan assumes a fairly high return on equities of 7%, the overall rate of return is less than 3.5%. It is also true that, had the Administration's proposal used, say, a 5.2% rate of return, it might have been able to ride over the mid-century crisis without raising contributions - though it still would have resulted at best in maintaining indefinitely the current contribution rate of 12½% as compared with that of our proposal of less than 7%.

But, does this imply that our proposal should be dismissed as of no practical value? Or, does it instead support the conclusion that the Administration may be missing the opportunity to provide a lasting solution to the Social Security problem?

The point is that the choice of the rate of return on the assets accumulated in the system is not a matter of personal preference or even of prudence (imposed on others). There are, in fact, objective criteria to support our choice versus that of the Administration. Specifically, the difference between our assumed overall rate of return and the Administration's does not come from our assuming fictitiously high returns from stocks and bonds respectively (if anything our assumptions are more conservative). The difference comes entirely from the *weighting* of the two components: the Administration chooses an arbitrary number of (not more than) 16% in equities, whereas we recommend including equities and debt instruments in proportion to their market capitalization. Equivalently, the portfolio should be a proportionate share of the market portfolio of all marketable securities-equities and debt. This is consistent with the proposition that a market portfolio is an efficient portfolio. But more fundamentally, it rests on the consideration that the rate of return promised to the forced saving in Social Security should approximate, as closely as possible, the (marginal) return on capital, *i.e.*, the number of real dollars per year that an investment of $100 adds to real GNP before taxes, on average over a suitable stretch of time.

One can obtain an approximate measure of this quantity from the average return to equities, (using the hypothesis that in the long run Tobin's Q should be one), but one must take into account two important adjustments. First, the return to equity corresponds to profit, and profit is not a satisfactory measure of the return to capital, whenever the firm is financed partly by debt (it has a "levered" capital structure). Rather, the return on capital is the return of a portfolio consisting of all outstanding shares and bonds (or an equal fraction of each); or equivalently a weighted average of the return on equity and the interest rate on debt, weighted by the share of each instrument in the "market capitalization" of the firm (the sum of the market value of equity and debt). But this is precisely the procedure we advocate: to invest in an indexed portfolio consisting of an appropriate share of the market portfolio. Now a quick perusal of available data (e.g., Federal Reserve Flow of Funds Accounts of the U.S.) suggests

that the share of equity in total capitalization is *substantially* higher than 16%; on average, it is closer to 70%.

If the Administration had used this realistic set of weights, it would have come up with a rate return on capital of nearly 6%, compared with our "conservative" 5.2%.

But 6% is an estimate of return on total corporate capital *after* corporate income taxes. Taking into account the corporate income tax on the order of 30% on the levered profit plus a 30% debt at a real interest around $3^1/_3$% leads to an estimate of the pre-tax return on total capital of about 8% divided as follows: 1% for interest and 7% to equity before tax. Of this, 0.3 times 7% or 2.1% is taken over by taxes leaving 4.9% as the net of tax return to the stockholders (but this return is on an equity investment of capital, so that the net of tax rate of return on equity is 7% as stated above). Finally, the *before tax* return of the unlevered portfolio consisting of 70% equity and 30% debt is found to be 8%, the total pre-tax return, or the net of tax return of 6% (see above) plus the 2% tax. The above estimate of a pre-tax return on the unlevered market portfolio is close to a well-known estimate of Poterba (1998) that leads to the conclusion that, "the pre-tax return on capital in the corporate non-financial sector has averaged 8.5% over the 1959-1996 period."[10]

We do not propose that the government should guarantee a fixed real rate of 8.5% (or even 8%) because we are fully aware that the return from equity is subject to a great deal of risk and that the market commands a *risk premium* for exchanging the market equity stream for a fixed interest stream. Based on this consideration, we like to offer a tentative suggestion that the Treasury should swap the market equity stream for a sure real interest rate of 5.2%. This would give the Treasury an expected *risk premium of some 3-3$^1/_4$%*. Indeed, when the TF is invested in the unlevered market portfolio, the expected return *to the Treasury* can be taken as the expected pretax return on total capital of 8-8½%, of which 6-6½ is the portfolio return, and the remaining 2% represents the increment in corporate income tax receipts. Without pretending to settle the current debate about the appropriate risk premium, we submit that 3% is a reasonable premium for the Treasury, given its long life and the

externality in the form of improvement in the welfare of participants by making it possible to offer defined benefits. But if the swap is such a "reasonable" deal, could it not be offered by private investors or speculators? The answer, of course, is that the risk premium earned by Treasury is much larger than that accruing to private investors because it alone benefits from the externality resulting from the rise in tax revenue.

It must be recognized, however, that the estimate of an extra 2% return to the Treasury from incremental tax revenue could be biased. For it rests on the assumption that all the TF investment in the unlevered equity of corporations is accompanied by an equal expansion in the stock of equities demanded, or, equivalently, that all other holders of market securities do not reduce their desired holdings. This of course need not be true: for instance, it is conceivable that the rise in saving due to TF would reduce foreign lending and investment in domestic stocks. If this should happen, our estimate of the tax gain is overestimated. On the other hand, the increased capital stock increases not only profits but also other income such as labor's (see, for example, Feldstein (1999), who follows this route and ends with a very similar estimate of the tax effect), and to this extent our estimate is downward biased. Presumably only experience could establish the true effect.

From an operational point of view, one could imagine that, at the time the swap is arranged, the Treasury would set up a sinking fund which would be credited (or debited) with the difference between the return of the market and the fixed rate (say, our 5.2%) plus an estimate of the tax levied on the profit of the equities held by the TF. A lower and upper limit would be established for the sinking fund. If it went above the upper bound, the surplus could be transferred to the budget and at the same time consideration would be given to raise the fixed swap rate and reduce contributions accordingly. Corresponding actions would be taken if the sinking fund went below the lower limit.

[10] See Poterba (1998).

4.3 How the rate of return affects the merits of alternative schemes

There is one more question concerning the rate of return that requires brief discussion. Does the advantage of the funded system over PAYGO depend on a high rate of return? Here one must distinguish between the merits of the systems in the long-run equilibrium, and the problems of transition from one system to the other. With respect to the first question, the answer is straightforward – the funded system dominates the PAYGO, provided that the rate of return on capital exceeds the rate of growth of income. Indeed, this is clearly the necessary and sufficient condition for the equilibrium contribution rate under funding to be lower that of PAYGO. (It will be recognized that this conclusion is in line with a well-known proposition about dynamic optimization of per capita consumption). It is hardly conceivable that this condition could fail to hold, at least as far ahead as one can see.

However, the situation is somewhat different in regard to the transition problem. As we have already demonstrated, if the Cost Ratio is not increasing over the relevant horizon (or the PAYGO system is such that it can take care of its pension obligations without raising the contribution rate), then, for any positive rate of return, our system will insure a transition in finite time to a permanently lower contribution with a monotonically decreasing rate of contribution (except for an initial additional contribution by the participants, the Government or through Social Security surplus that is necessary to get the TF accumulation started). The rate of return would of course affect the equilibrium contribution and the length of the transition.

But the above conclusion does not necessarily hold when the system of PAYGO is not self-sustaining and is heading for insolvency, as is the case for the U.S.[11] In particular for the U.S., in the absence of a Government subsidy, the system would run into deficits by the end of the first quarter of the next century. And even with proposed program of generous government subsidies, it would not be able to deliver the promised benefits without a hefty increase in PAYGO contributions. In this situation, one part of the TF interest must be used

to plug the growing hole due to the rising cost ratio. There is then no guarantee that our system, even with the assumed Government contribution, can deliver the "miracle" of transforming a PAYGO system into a fully funded one, in *finite time and without ever raising contributions,* unless the rate of return is high enough.

We have not established what is the precise minimum feasible rate, but we have run a few more simulations, not reported here, from which we have established that the "miracle" is still possible with a rate of 5%, though at the cost of raising the equilibrium contribution to 7.4%, and with cuts being much less aggressive and with contributions briefly raised by 0.3%-0.6% between 2012 and 2045.[12] However, we recall that these standard paths can be modified utilizing a trade-off between the time of the first cut and the duration of the transition period.

On the other hand, with a 4% gross return the "miracle" is no longer possible because the system is never able to accumulate enough assets so that the return on these assets together with the equilibrium contributions are sufficient to cover the terminal cost ratio. Even in this case, the full transition is possible, but it will require some additional contributions by the Government and/or the participants.

[11] See Modigliani, Ceprini and Muralidhar (1999).

[12] These increases are the exact DI deficits in those years and hence forces the first cut of 0.1% to be made every year starting in 2045. Hence under this simulation, contributions return to 12.4% in 2050, but are cut less aggressively thereafter.

4.4 Impact of the increase in the stock of capital on the rate of return

The last issue that must be recognized is that of the possible feedback of the introduction of a fully funded system on the rate of return. There is no question that by the time the funded system has reached equilibrium, it will result in a substantial increase in the amount of *national* capital.[13] To illustrate, we have shown that with a 5.2% rate of return and a 20% cost ratio, the TF net assets should amount, in steady state to roughly, 3.1 times the wage bill; or nearly 2.3% of national income, since the wage bill is around 75% of national income.[14] Now, the ratio of private wealth to national income can be placed at around 4.5; thus, the new system would imply a rise in the wealth-income ratio by an impressive additional 50%. However, this is not the full story for the effect on interest rates should depend on the growth of productive tangible capital, which is less than wealth because the latter includes the holding of government debt. If we eliminate this component, the ratio of capital to income has recently tended to be just below 4. Therefore, the rise in the capital-income ratio could be close to 57%. Such a development could have a significant effect in reducing the rate of return of corporate capital. But one must be cautious in accepting the above estimate. On one hand, the rise in the TF wealth could induce some offsetting reduction in personal wealth holding. But, on the other, it must be remembered that in an open economic system, what one should focus on is not the growth in American capital, but in "world" capital.

[13] See Munnell,(1999): "Reforming Social Security. The case against individual accounts". Draft for National Tax Journal, 8/12/99. This criticism has also been elaborated in personal correspondence

[14] This calculation is made assuming a 1% growth rate and a one year lag between the first contribution and the first pension payment..

5. Possible innovations

5.1 Temporary borrowing from pension reserves

It was mentioned earlier that our proposal lends itself to an important innovation: the ability to borrow some portion of the funds. This requires the creation of individual accounts, within a defined-benefits, fully-funded scheme, which is readily feasible.

This novel feature would permit individuals to borrow against some fraction of the accumulated funds in their individual accounts, with strict repayment rules. The main merit of such a proposal is to correct a serious shortcomings of standard Social Security systems, namely, that the credit accumulated toward a pension is a completely illiquid asset. When combined with the standard payroll tax, it has the effect of smoothing the accumulation of assets rather than consumption. The ability to borrow at a reasonable rate imparts some liquidity to that accumulation, reducing the shortcoming. Experience with the 401(k) type of accounts suggests that this feature is especially valuable to younger households that are frequently liquidity-constrained.

The risk of default on such loans could be mitigated through strict penalties for non-performance, as is confirmed by experience with the 401(k) loan program, or even by an insurance program. Even this limited additional liquidity would be welfare improving over the current system.[15]

[15] The SSA provides participants with statements of estimated benefits and the same calculations could be used to establish appropriate lower bounds.

6. Conclusion

In this paper, we have endeavored to show how the current Social Security structure of defined benefits, whose future is seriously threatened, can be permanently preserved by gradually replacing the current pay-as-you-go financing with a new, *fully funded, defined-benefits* system. The new scheme directly supports the welfare objectives of the present SS schemes, as current benefits are maintained.

This conclusion is supported by many considerations among which the following are crucial:

First, under PAYGO the contributions, which are in effect compulsory saving, are used to finance the pensions and hence consumption. In the new funded system, these savings are invested in financial assets that grow large by the time of retirement and produce a return that makes it possible to reduce the required cash contribution below the PAYGO contribution by a large factor, typically ½ to two-thirds. The funded SS would be gradually accumulating a large pool of assets (possibly credited to individual accounts), of the order of 2½-3 times wages.

Second, PAYGO is financially unsound and forever at risk of insolvency because the contribution required for the promised benefits is highly sensitive to variations in population structure and productivity growth. With a funded system, the contribution is largely invariant from either variable. It is sensitive to the rate of return on financial assets, but moderately in the relevant range.

We recommend investing these assets in a common fund holding a strictly indexed portfolio of all marketable securities, (equity and debt), managed by the government and/or private managers on the basis of the lowest bidder. Such a portfolio has desirable efficiency properties and leaves no discretion to those in charge of the TF. If feasible, we further advocate allocating the assets of the Social Security common fund to individual accounts: i) to make participants more aware of the relation between their contributions and the growth of

their balance, ii) to eliminate the temptation of Congress to divert the TF assets to other purposes, and iii) to make possible for participants to borrow from their accounts.

Unfortunately, there are costs in the transition from the PAYGO to the funded system as saving needs to be boosted, at least temporarily, to fund the unfunded pension liability. We lay out an operational program for the transition in which these costs are shown to be transitory and contained within moderate limits-something like an additional payroll levy averaging some 3.2% for some 15 years. We argue that for the U.S. these costs can and should be absorbed by the Government by redirecting to SS the share of the large budget surplus anticipated over the next 15 years, which the Administration as well as Congress seems to be ready to pledge toward saving the PAYGO system and taking advantage of the surplus already accumulated in the Trust Fund and expected to continue in the near future. In this case, the transition can be accomplished without any additional levy, though this is achieved at the cost of a long transition.

We suggest that our permanent solution is preferable to that presently advocated by the Administration, which is but a temporary one, and also to the set of proposals that goes under the misnomer of “privatization” of Social Security. These proposals generally involve only partial funding, and hence a substantially higher long-run contribution rate. But, what is worse, their basic feature is the principle of mandated contributions to individually managed accounts. These are not only much more expensive to manage, but also imply giving up the social welfare promoting principle of *defined benefits* in favor of a *defined contributions* approach with its serious risks-especially for poorer, less sophisticated participants-and high cost to government if a minimum outcome is guaranteed. Last, but not least, they would contribute importantly to increase unnecessarily and arbitrarily the inequalities in the distribution of pension income.

APPENDIX

A detailed account of the transition for the U.S. with the "intermediate costs" assumptions

Tables 3 (and 4) are organized to show the cost ratio, followed by the various elements that make up the inflow to Social Security including the household contributions, tax rebate, government subsidy and accrued interest.

The participants receive the OASDI benefits that are shown in col. (1) as ratio to wages-the so-called "Cost Ratio'' (CR). These figures are taken from the projections made by the SSA for the intermediate cost case. They represent the best estimate of the amount of benefits that must be paid if past promises of benefits are to be honored. CR rises rapidly to just over 18% by the second quarter of the century (cf. Fig. 2), before reaching 19.5% in 2075.

The next column (2) shows the path of contributions made possible by our plan. Up until 2057, it remains at the current level of 12.4, but thereafter it is set at levels *selected by us* to ensure *a one time reduction in contributions to the final steady state*. Table 4 has been calibrated to ensure a more smooth transition to ensure greater intergenerational sharing of the burden. The essential fact here is that, by the end of the third quarter, this contribution can be "permanently" cut to just over 6% (or 7.8% in the case of the more smooth transition) while maintaining the benefits at the promised level (the Cost Ratio) and keeping the system solvent.

The exact path of contributions made possible by our approach for the one-time reduction is reported in col. (2) and shown in Fig. 2. The equilibrium contribution is 6.2%, or less than 1/3 of the terminal cost ratio. It is reached only at the end of the third quarter. But what is important is that we can begin to cut the contributions much earlier. In our simulation we begin cutting as early as 2058, and by more in the 2070s to reach 6.2%. By contrast, as can be seen from Fig. 2, the Administration program calls for *raising* the contribution sharply beginning in the mid-2050's terminating at 19.5%. However, 6.2% is

the long term *required contribution rate for a funded system earning a 5.2% sure gross real return on its assets*. With growth in productivity and labor force projected at a combined 1.2% (on average approx. 1.3% over the century), this gives a net rate of approximately 4% in steady state. It is calculated along the lines of Table 1B, for the growth estimates shown there, which are consistent with the SSA projections and parameters.

The next column is the tax rebated to Social Security for taxes on pensions. This is treated as an inflow to help defray the pensions. Col. (4) provides an estimate of the transition cost and in this set of Tables is calibrated to equal the transfers from the budget promised by the President. Col. (6) provides the interest on the consolidated Trust Fund. Since we are using a one-fund approach it is a consolidated figure – under a two fund approach, this interest is on the funds accruing under the NF and the old OASDI. Col.(8) provides the surplus of inflows over outflows and over time as the pensions grow to the 19.47%. The last columns provide the asset/wages and the benefit to wages ratio.

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Table 1A

Cost and Contribution Rates for Alternative Systems and Selected Scenarios
Assumptions: Working Life = 40 Years; Average Salary = 50% Replacement

	Cost Ratio = *Pay-as-you-go* Scheme Contribution Rates for Different Scenarios							
	Retired Life - 16 Years				Retired Life - 18 Years			
	Real Productivity Growth				Real Productivity Growth			
	0%	1.00%	1.40%	2.00%	0%	1.00%	1.40%	2.00%
Population Growth								
0%	20.00%	15.40%	13.40%	11.90%	22.50%	17.20%		
1%	15.05%	11.70%	10.40%	9.00%	16.77%			
2%	11.24%	8.80%	7.00%	N/A	12.41%			N/A

Table 1B

	Cost Ratio = *Funded* Scheme Contribution Rates for Different Scenarios							
	Retired Life - 16 Years				Retired Life - 18 Years			
	Real Productivity Growth							
	0%	1.00%	1.40%	2%	0%	1.00%	1.40%	2%
Return on Assets								
0%	20.00%	20.11%	20.15%	20.23%	22.50%	22.62%	22.67%	22.75%
1%	15.05%	15.33%	15.45%	15.63%	16.77%	17.08%	17.21%	17.41%
2%	11.24%	11.60%	11.75%	11.97%	12.41%	12.81%	12.97%	13.22%
3%	8.33%	8.70%	8.86%	9.10%	9.12%	9.53%	9.70%	9.96%
4%	6.13%	6.48%	6.63%	6.86%	6.66%	7.04%	7.21%	7.46%
5%	4.49%	4.80%	4.93%	5.14%	4.84%	5.17%	5.32%	5.54%
6%	3.26%	3.53%	3.64%	3.82%	3.50%	3.78%	3.90%	4.09%
Approx. replacement on final salary	50%	41%	38%	34%	50%	41%	38%	34%

Table 2

	New Fund						OASDI		
	Sources		Uses						
	Contributions to New Fund	New Fund Accrued Interest= $[(5)_{t-1}]*.06$	New Fund Pensions	New Fund Surplus =(1)+(2)-(3)	New Fund Assets $=(5)_{t-1}+(4)$	Social Security Pensions = (7)-(3)	Pensions or Cost Ratio	Total Contributions to SS	Govt Subsidy/ Transition Cost
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2000	**2.00%**	0.00%	0.02%	1.98%	1.98%	18.73%	18.75%	20.75%	2.00%
2001	**2.00%**	0.12%	0.02%	2.10%	4.08%	18.73%	18.75%	20.75%	2.00%
2002	**2.00%**	0.25%	0.04%	2.21%	6.29%	18.71%	18.75%	20.75%	2.00%
2003	**2.00%**	0.38%	0.08%	2.30%	8.58%	18.67%	18.75%	20.75%	2.00%
2004	**2.00%**	0.52%	0.10%	2.42%	11.00%	18.65%	18.75%	20.75%	2.00%
2005	**2.00%**	0.66%	0.14%	2.52%	13.53%	18.61%	18.75%	20.75%	2.00%
2006	**2.00%**	0.82%	0.20%	2.62%	16.14%	18.55%	18.75%	20.75%	2.00%
2007	**2.00%**	0.97%	0.24%	2.73%	18.87%	18.51%	18.75%	20.75%	2.00%
2008	**2.00%**	1.14%	0.30%	2.84%	21.71%	18.45%	18.75%	20.75%	2.00%
2009	**2.00%**	1.31%	0.38%	2.93%	24.64%	18.37%	18.75%	20.75%	2.00%
2010	**2.00%**	1.49%	0.45%	3.04%	27.68%	18.30%	18.75%	20.75%	2.00%
2011	**2.00%**	1.67%	0.54%	3.13%	30.80%	18.21%	18.75%	20.75%	2.00%
2012	**2.00%**	1.86%	0.64%	3.22%	34.02%	18.11%	18.75%	20.75%	2.00%
2013	**2.00%**	2.05%	0.74%	3.31%	37.33%	18.01%	18.75%	20.75%	2.00%
2014	**2.00%**	2.25%	0.85%	3.40%	40.73%	17.90%	18.75%	20.75%	2.00%
2015	**2.00%**	2.46%	0.98%	3.48%	44.21%	17.77%	18.75%	20.75%	2.00%
2016	**2.00%**	2.67%	1.10%	3.57%	47.78%	17.65%	18.75%	18.75%	0.00%
2017	**2.00%**	2.88%	1.24%	3.64%	51.42%	17.51%	18.75%	18.75%	0.00%
2018	**2.00%**	3.10%	1.38%	3.72%	55.14%	17.37%	18.75%	18.75%	0.00%
2019	**2.00%**	3.32%	1.54%	3.78%	58.92%	17.21%	18.75%	18.75%	0.00%
2020	**2.00%**	3.55%	1.70%	3.85%	62.77%	17.05%	18.75%	18.75%	0.00%
2021	**2.00%**	3.78%	1.88%	3.90%	66.68%	16.87%	18.75%	18.75%	0.00%
2022	**2.00%**	4.02%	2.05%	3.97%	70.65%	16.70%	18.75%	18.75%	0.00%
2023	**2.00%**	4.26%	2.24%	4.02%	74.67%	16.51%	18.75%	18.75%	0.00%
2024	**2.00%**	4.50%	2.45%	4.05%	78.72%	16.30%	18.75%	18.75%	0.00%
2025	**3.50%**	4.75%	2.67%	5.58%	84.30%	16.09%	18.75%	18.75%	0.00%
2026	**3.50%**	5.08%	2.92%	5.67%	89.97%	15.84%	18.75%	18.75%	0.00%
2027	**3.50%**	5.42%	3.17%	5.75%	95.72%	15.58%	18.75%	18.75%	0.00%
2028	**3.50%**	5.77%	3.46%	5.81%	101.53%	15.29%	18.75%	18.75%	0.00%
2029	**3.50%**	6.12%	3.73%	5.90%	107.43%	15.03%	18.75%	18.75%	0.00%
2030	**3.50%**	6.48%	4.06%	5.92%	113.35%	14.70%	18.75%	16.75%	0.00%
2031	**3.50%**	6.83%	4.40%	5.93%	119.28%	14.35%	18.75%	16.75%	0.00%
2032	**3.50%**	7.19%	4.78%	5.91%	125.19%	13.97%	18.75%	16.75%	0.00%
2033	**3.50%**	7.55%	5.17%	5.88%	131.08%	13.59%	18.75%	16.75%	0.00%
2034	**3.50%**	7.90%	5.59%	5.82%	136.89%	13.17%	18.75%	16.75%	0.00%
2035	**3.50%**	8.25%	6.02%	5.74%	142.63%	12.73%	18.75%	14.75%	0.00%
2036	**3.50%**	8.60%	6.51%	5.59%	148.22%	12.25%	18.75%	14.75%	0.00%

Table 3

	Pensions or Cost Ratio	Household Contrib. to Pensions	Tax Rebate	Govt Subsidy	Total Contributions = (2)+(3)+(4)	Trust Fund Accrued Interest = $(9)_{t-1}$*(Int Rate-LF-RealSal)	Inflows to SS = (6)+(5)	Social Security Surplus = (7)-(1)	Trust Fund = $(9)_{t-1}$+(8)	Total Assets/ Benefits =(9)/(1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2000	10.48%	12.40%	0.25%	2.10%	14.75%	0.20%	14.95%	4.47%	24.11%	230%
2001	10.45%	12.41%	0.27%	1.70%	14.38%	0.58%	14.96%	4.51%	28.62%	274%
2002	10.50%	12.40%	0.28%	2.20%	14.88%	0.74%	15.62%	5.12%	33.74%	321%
2003	10.69%	12.43%	0.26%	2.00%	14.69%	1.01%	15.70%	5.01%	38.75%	363%
2004	10.68%	12.40%	0.29%	2.40%	15.09%	1.32%	16.41%	5.73%	44.48%	416%
2005	10.79%	12.40%	0.30%	2.50%	15.20%	1.56%	16.76%	5.97%	50.45%	468%
2006	10.91%	12.39%	0.31%	3.00%	15.70%	1.72%	17.42%	6.51%	56.95%	522%
2007	11.05%	12.40%	0.31%	3.40%	16.11%	1.99%	18.10%	7.05%	64.00%	579%
2008	11.16%	12.10%	0.63%	3.80%	16.53%	2.18%	18.71%	7.55%	71.55%	641%
2009	11.20%	12.40%	0.34%	4.10%	16.84%	2.50%	19.34%	8.14%	79.69%	712%
2010	11.50%	12.39%	0.36%	4.30%	17.05%	2.79%	19.84%	8.34%	88.03%	766%
2011	11.78%	12.40%	0.36%	4.50%	17.26%	3.08%	20.35%	8.57%	96.60%	820%
2012	12.08%	12.41%	0.37%	4.60%	17.38%	3.42%	20.80%	8.72%	105.32%	872%
2013	12.31%	12.40%	0.39%	4.60%	17.39%	3.77%	21.16%	8.85%	114.17%	927%
2014	12.61%	12.41%	0.40%	4.50%	17.31%	4.13%	21.44%	8.83%	123.00%	975%
2015	12.92%	12.40%	0.42%	0.00%	12.82%	4.50%	17.32%	4.40%	127.40%	986%
2016	13.26%	12.40%	0.44%	0.00%	12.84%	4.71%	17.55%	4.29%	131.69%	993%
2017	13.60%	12.41%	0.45%	0.00%	12.86%	4.93%	17.78%	4.18%	135.87%	999%
2018	13.98%	12.40%	0.47%	0.00%	12.87%	5.14%	18.01%	4.03%	139.90%	1001%
2019	14.31%	12.40%	0.49%	0.00%	12.89%	5.34%	18.24%	3.93%	143.83%	1005%
2020	14.67%	12.40%	0.51%	0.00%	12.91%	5.55%	18.46%	3.79%	147.62%	1006%
2021	15.02%	12.34%	0.59%	0.00%	12.93%	5.76%	18.69%	3.67%	151.29%	1007%
2022	15.33%	12.40%	0.55%	0.00%	12.95%	5.90%	18.85%	3.52%	154.81%	1010%
2023	15.66%	12.40%	0.57%	0.00%	12.97%	6.04%	19.01%	3.35%	158.16%	1010%
2024	15.96%	12.40%	0.59%	0.00%	12.99%	6.17%	19.16%	3.20%	161.35%	1011%
2025	16.23%	12.40%	0.61%	0.00%	13.01%	6.29%	19.30%	3.07%	164.43%	1013%
2026	16.50%	12.40%	0.63%	0.00%	13.03%	6.41%	19.44%	2.94%	167.37%	1014%
2027	16.75%	12.40%	0.64%	0.00%	13.04%	6.53%	19.57%	2.82%	170.19%	1016%
2028	16.97%	12.40%	0.66%	0.00%	13.06%	6.64%	19.70%	2.73%	172.91%	1019%
2029	17.16%	12.39%	0.68%	0.00%	13.07%	6.74%	19.82%	2.66%	175.57%	1023%
2030	17.33%	12.40%	0.69%	0.00%	13.09%	6.85%	19.94%	2.61%	178.18%	1028%
2031	17.47%	12.50%	0.60%	0.00%	13.10%	6.95%	20.05%	2.58%	180.76%	1035%
2032	17.60%	12.39%	0.72%	0.00%	13.11%	7.07%	20.18%	2.58%	183.34%	1042%
2033	17.71%	12.40%	0.73%	0.00%	13.13%	7.19%	20.31%	2.60%	185.94%	1050%
2034	17.78%	12.40%	0.74%	0.00%	13.14%	7.31%	20.45%	2.67%	188.61%	1061%
2035	17.82%	12.40%	0.75%	0.00%	13.15%	7.43%	20.58%	2.76%	191.37%	1074%
2036	17.85%	12.39%	0.76%	0.00%	13.15%	7.56%	20.71%	2.86%	194.23%	1088%
2037	17.86%	12.40%	0.76%	0.00%	13.16%	7.69%	20.85%	2.99%	197.22%	1104%

Table 4

	Pensions or Cost Ratio	Household Contrib. to Pensions	Tax Rebate	Govt Subsidy	Total Contributions = (2)+(3)+(4)	Trust Fund Accrued Interest = $(9)_{t-1}$*(Int Rate-LF-RealSal)	Inflows to SS = (6)+(5)	Social Security Surplus = (7)-(1)	Trust Fund = $(9)_{t-1}$+(8)	Total Assets/ Benefits =(9)/(1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2000	10.48%	12.40%	0.25%	2.10%	14.75%	0.20%	14.95%	4.47%	24.11%	230%
2001	10.45%	12.41%	0.27%	1.70%	14.38%	0.58%	14.96%	4.51%	28.62%	274%
2002	10.50%	12.40%	0.28%	2.20%	14.88%	0.74%	15.62%	5.12%	33.74%	321%
2003	10.69%	12.43%	0.26%	2.00%	14.69%	1.01%	15.70%	5.01%	38.75%	363%
2004	10.68%	12.40%	0.29%	2.40%	15.09%	1.32%	16.41%	5.73%	44.48%	416%
2005	10.79%	12.40%	0.30%	2.50%	15.20%	1.56%	16.76%	5.97%	50.45%	468%
2006	10.91%	12.39%	0.31%	3.00%	15.70%	1.72%	17.42%	6.51%	56.95%	522%
2007	11.05%	12.40%	0.31%	3.40%	16.11%	1.99%	18.10%	7.05%	64.00%	579%
2008	11.16%	12.10%	0.63%	3.80%	16.53%	2.18%	18.71%	7.55%	71.55%	641%
2009	11.20%	12.40%	0.34%	4.10%	16.84%	2.50%	19.34%	8.14%	79.69%	712%
2010	11.50%	12.39%	0.36%	4.30%	17.05%	2.79%	19.84%	8.34%	88.03%	766%
2011	11.78%	12.40%	0.36%	4.50%	17.26%	3.08%	20.35%	8.57%	96.60%	820%
2012	12.08%	12.41%	0.37%	4.60%	17.38%	3.42%	20.80%	8.72%	105.32%	872%
2013	12.31%	12.40%	0.39%	4.60%	17.39%	3.77%	21.16%	8.85%	114.17%	927%
2014	12.61%	12.41%	0.40%	4.50%	17.31%	4.13%	21.44%	8.83%	123.00%	975%
2015	12.92%	12.40%	0.42%	0.00%	12.82%	4.50%	17.32%	4.40%	127.40%	986%
2016	13.26%	12.40%	0.44%	0.00%	12.84%	4.71%	17.55%	4.29%	131.69%	993%
2017	13.60%	12.41%	0.45%	0.00%	12.86%	4.93%	17.78%	4.18%	135.87%	999%
2018	13.98%	12.40%	0.47%	0.00%	12.87%	5.14%	18.01%	4.03%	139.90%	1001%
2019	14.31%	12.40%	0.49%	0.00%	12.89%	5.34%	18.24%	3.93%	143.83%	1005%
2020	14.67%	12.40%	0.51%	0.00%	12.91%	5.55%	18.46%	3.79%	147.62%	1006%
2021	15.02%	12.34%	0.59%	0.00%	12.93%	5.76%	18.69%	3.67%	151.29%	1007%
2022	15.33%	12.40%	0.55%	0.00%	12.95%	5.90%	18.85%	3.52%	154.81%	1010%
2023	15.66%	12.40%	0.57%	0.00%	12.97%	6.04%	19.01%	3.35%	158.16%	1010%
2024	15.96%	12.40%	0.59%	0.00%	12.99%	6.17%	19.16%	3.20%	161.35%	1011%
2025	16.23%	12.40%	0.61%	0.00%	13.01%	6.29%	19.30%	3.07%	164.43%	1013%
2026	16.50%	12.40%	0.63%	0.00%	13.03%	6.41%	19.44%	2.94%	167.37%	1014%
2027	16.75%	12.40%	0.64%	0.00%	13.04%	6.53%	19.57%	2.82%	170.19%	1016%
2028	16.97%	12.40%	0.66%	0.00%	13.06%	6.64%	19.70%	2.73%	172.91%	1019%
2029	17.16%	12.39%	0.68%	0.00%	13.07%	6.74%	19.82%	2.66%	175.57%	1023%
2030	17.33%	12.40%	0.69%	0.00%	13.09%	6.85%	19.94%	2.61%	178.18%	1028%
2031	17.47%	12.50%	0.60%	0.00%	13.10%	6.95%	20.05%	2.58%	180.76%	1035%
2032	17.60%	12.39%	0.72%	0.00%	13.11%	7.07%	20.18%	2.58%	183.34%	1042%
2033	17.71%	12.40%	0.73%	0.00%	13.13%	7.19%	20.31%	2.60%	185.94%	1050%
2034	17.78%	12.40%	0.74%	0.00%	13.14%	7.31%	20.45%	2.67%	188.61%	1061%
2035	17.82%	12.40%	0.75%	0.00%	13.15%	7.43%	20.58%	2.76%	191.37%	1074%
2036	17.85%	12.39%	0.76%	0.00%	13.15%	7.56%	20.71%	2.86%	194.23%	1088%

Figure 1
Zero Growth Case:
Transition from PAYG to Funding
(% Taxable Payroll)

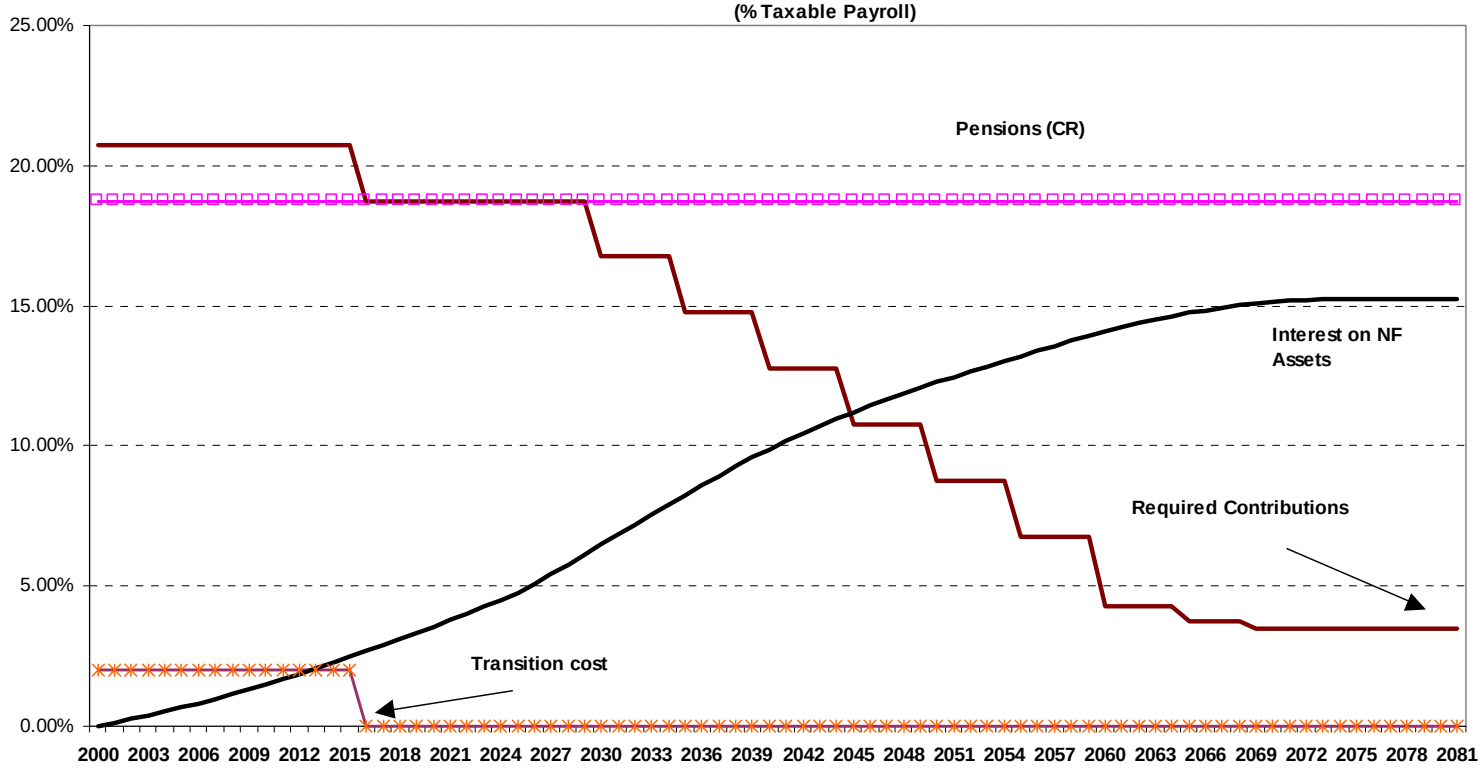

Figure 2
Comparison of Contribution Rates
under Different Reform Scenarios

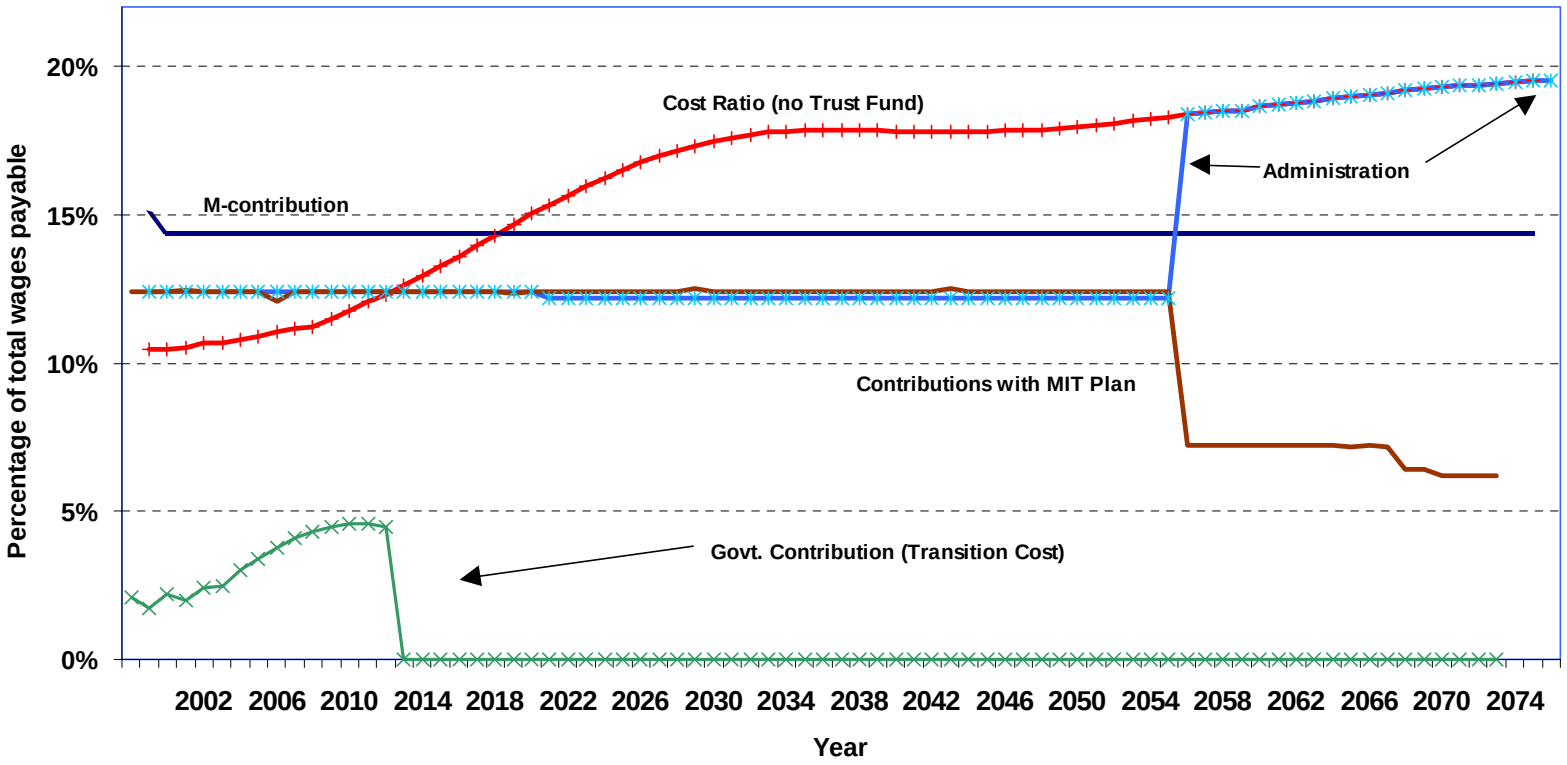

Figure 3
Comparison of Contribution Rates
under Different Reform Scenarios