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How Pension Financing Affects Returns to Different Generations

A pension system designed to be self-sustaining can be financed in two basic ways: on a "funded" or on a "pay-as-you-go" basis. In a funded system, contributions are used to purchase assets, which are saved to pay for future benefits. (In the United States, private pension plans are required by law to be funded.) By contrast, in a pay-as-you-go system, such as Social Security,[1] contributions by workers go directly to pay benefits to retirees. A pay-as-you-go pension system can provide higher returns than a funded system to particular generations who retire relatively soon after the system is implemented or benefits are increased, but a funded system provides higher returns in the long run. However, moving a pension system from a pay-as-you-go to a funded basis would impose a burden on some generations.

In either type of pension system, over time the total amount of contributions must equal the total amount of benefits in present value.[2] If, on average, some generations receive more than they contributed, then some other generations must get less in benefits than they paid into the system. This brief examines how funded and pay-as-you-go systems have different effects on the relative financial returns that different generations receive.

The analysis in this brief focuses on broad, general attributes of pension systems. It examines the average benefits received and taxes paid by different generations, rather than the benefits and taxes of particular members of those generations. The brief does not address issues of implementation.[3]

Returns in Funded and Pay-As-You-Go Systems

In a funded system, contributions are used to purchase assets that finance benefits upon retirement. The average rate of return that participants receive on their contributions in a funded system is the average rate of return on those assets. That is equivalent to the rate people could earn if they saved the money themselves rather than contributing it to the system. Therefore, in general, a funded system does not affect the average financial resources available to any generation.[4]

By contrast, in a pay-as-you-go system, the average rate of return—and therefore the effect of the system on generations' financial resources—can differ widely for different generations depending on whether they face stable or changing tax and benefit rates.[5] First, consider the people who participate in a system with constant tax and benefit rates over their whole lives. For them, the sustainable average implicit return is limited to the growth rate of the

1. In a pure pay-as-you-go system, revenues exactly equal outlays in each year. Social Security is not a pure pay-as-you-go system; its revenues (excluding interest on the balances in the two Social Security trust funds) currently exceed outlays by about 14 percent. That excess of revenues over outlays is temporary; beyond 2018, revenues are projected to fall short of outlays by increasing amounts. See Congressional Budget Office, *The Outlook for Social Security* (June 2004).

2. Present value adjusts for the fact that money is more valuable the earlier it is received because it can be invested and earn interest.

3. See, for example, Congressional Budget Office, *Acquiring Financial Assets to Fund Future Entitlements,* Long-Range Fiscal Policy Brief No. 8 (June 16, 2003).

4. Differences in the tax treatment of individual savings versus pension contributions can create an apparent financial advantage for participants in a funded system. However, some generation must finance the tax advantage; to the extent it is financed by the same generation that receives it, there is no net gain. Differences in the cost of managing group as opposed to individual savings could lead to modest differences in returns.

5. In a pay-as-you-go system, the rate of return is not explicit. An "implicit" rate of return on contributions can be calculated for each generation on average. That implicit rate is the rate of return a generation's contributions would need to earn to exactly finance its pension benefits.

Box 1.

Rates of Return in a Pay-As-You-Go System

In a (mostly) pay-as-you-go pension system such as Social Security, the tax base that finances benefits is largely labor earnings. In such a system, if overall earnings rise over time with growth of the population or productivity, a constant tax rate implies that each new generation of workers pays more in total taxes—and can finance more benefits—than previous generations. Therefore, to the extent that overall earnings grow over time, retirees can receive more in benefits than they paid in taxes in a pay-as-you-go system.[1]

Rates of return even on relatively safe assets such as government bonds tend to be higher than the growth rate of earnings. For example, between 1980 and 2003, the real interest rate on 10-year government bonds averaged about 4.6 percent, while total wages and salaries grew at an average rate of 2.2 percent (adjusted for inflation).

As long as the rate of return on assets is higher on average than the growth rate of earnings, people facing constant tax and benefit rates can receive higher net benefits in a funded system than in a pay-as-you-go system. Moreover, people in a pay-as-you-go system could receive the rate of return on assets if they saved their payroll taxes rather than paying them. Thus, generations who face constant tax and benefit rates under a pay-as-you-go system have lower lifetime resources than they would without any system. By contrast, if the rate of growth of the tax base were to exceed the rate of return on assets, all generations—both in the short and the long runs—could benefit from a pay-as-you-go system.

1. As the average growth rate of total earnings fluctuates because of changes in the rate of growth of population and labor productivity, the sustainable rate of return in a pay-as-you-go system will also fluctuate. For example, when members of the baby-boom generations begin to retire in large numbers, the growth of the labor force, and therefore overall earnings, will also slow (if the growth rate of wages is stable), reducing Social Security's sustainable rate of return.

base from which taxes are drawn, rather than the rate of return on assets. In general, the growth rate of that tax base—labor earnings in most systems—tends to be lower than the rate of return that people would earn if they invested their contributions rather than paying them into the system (see Box 1).

However, not all generations face constant tax and benefit rates, so not all lose from a pay-as-you-go system. Any particular generation can gain on average if payroll taxes and benefits are increased close to or after its retirement, because only working people pay the increased taxes. Similarly, a pay-as-you-go system provides gains to generations who retire near the inception of the program, because they receive benefits even if they paid little or nothing in taxes. By creating winners and losers in that way, the system shifts resources among generations.

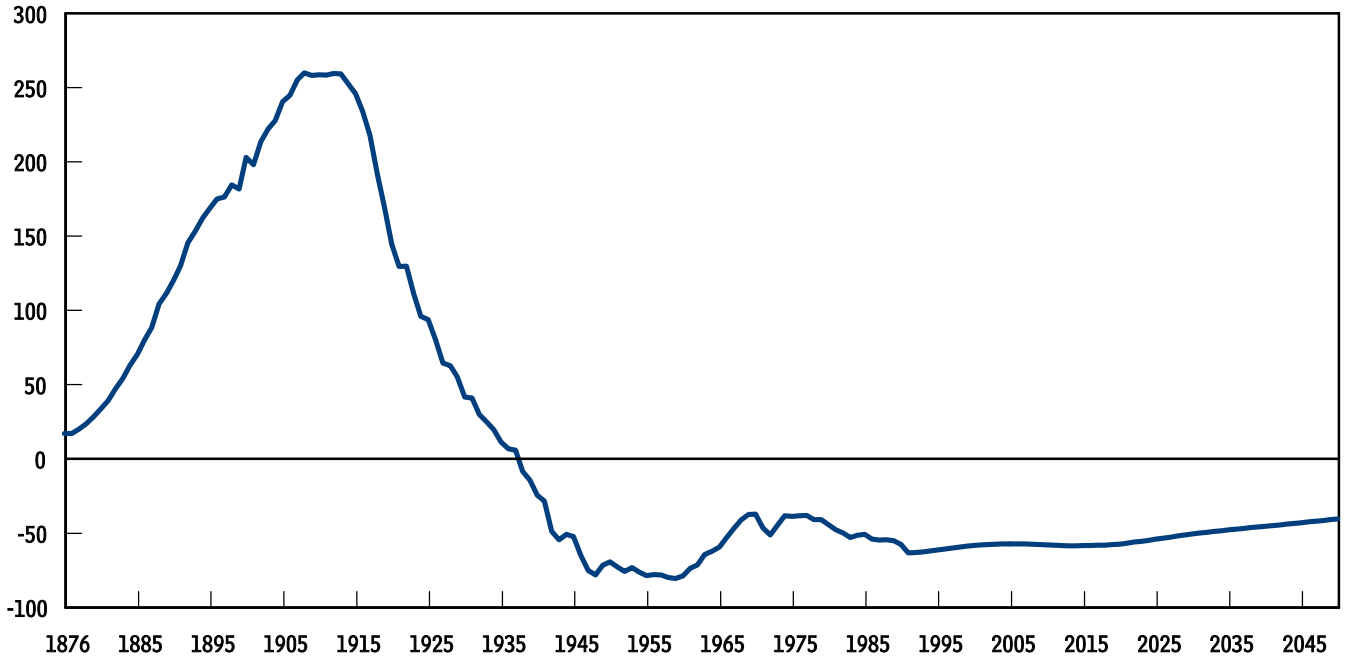
For example, members of the generation born in 1900 received almost seven times as much in Social Security benefits as they paid in payroll taxes (in present value). Later generations also benefited from expansions of the program. Altogether, the generations born between 1876 and 1937 are projected to receive a total of $8.1 trillion more from the Social Security system than they paid in.[6] Those gains are balanced by projected losses for generations

6. See Dean R. Leimer, *Cohort-Specific Measures of Lifetime Net Social Security Benefits,* ORS Working Paper 59 (Social Security Administration, Office of Research and Statistics, February 1994), p. 69.

Figure 1.

Social Security's Transfer of Wealth Among Generations by Each Cohort's Year of Birth

(Billions of 2003 dollars)



Source: Congressional Budget Office based on data from Dean R. Leimer, *Cohort-Specific Measures of Lifetime Net Social Security Benefits,* ORS Working Paper 59 (Social Security Administration, Office of Research and Statistics, February 1994).

Notes: This figure shows the present value of the transfers; that is, the figure has been adjusted for the fact that money is more valuable the earlier it is received because it can be invested and earn interest.

Projections of wealth transfers assume that Social Security benefits are reduced to the level that can be financed by payroll taxes and income taxes on benefits.

born after 1937 because returns on contributions fall below market rates of return (see Figure 1).[7]

Changes to the program can shift those losses among generations but can do little to change the total level. For example, shifting the system from a pay-as-you-go to a funded basis could eliminate the losses for generations living after the transition was completed. However, for intervening generations, that transition would mean increased losses—totaling an amount equal in present value to all of the gains by previous generations.[8]

The Burden Created by Past Transfers

The way that net transfers to initial generations under Social Security place an unavoidable burden on later generations can be illustrated through a simple example. Suppose that a generation's lifetime cycle of work and retirement is collapsed into two stylized periods: the first period spent working and the second spent in retirement. As each generation goes to work, it earns $100 (so in this simple example, there is no economic growth). In the ab-

7. Some commentators argue that the transfers to early generations were justified because many of them lived through the hardship of the Great Depression and World War II. Moreover, because of growth in productivity and wages, the standard of living of later generations far exceeds that of the early ones, even after those transfers.

8. See Randall P. Mariger, *Social Security Privatization: What Are the Issues?* Technical Paper 1999-8 (August 1999), available at www.cbo.gov/tech.cfm; and John Geanakoplos, Olivia Mitchell, and Stephen P. Zeldes, "Social Security Money's Worth," in Olivia Mitchell, Robert J. Myers, and Howard Young, eds., *Prospects for Social Security Reform* (Philadelphia: Pension Research Council and University of Pennsylvania Press, 1999).

Table 1.

Transfers to and from Participants in a Simple Pay-As-You-Go Pension System

	Period				
Generation	1	2	3	4	5
1	0	Benefit of $10			
2		Contribution of $10	Benefit of $10		
3			Contribution of $10	Benefit of $10	
4				Contribution of $10	Benefit of $10

Source: Congressional Budget Office.

Note: In this example, the pension system is instituted in period 2. The table collapses the life cycle of each generation into two periods, the first spent working and the second spent in retirement. The life cycle of each generation is read across each row of the table; for example, generation 1 is working in period 1 and retired in period 2.

sence of Social Security, people must finance all of their retirement by saving during their working years.

Now imagine that a pay-as-you-go pension system like Social Security is instituted. A payroll tax of 10 percent is levied on the generation working at that time, and the resulting $10 in revenue is given to those in retirement (see Table 1). Clearly, those in retirement when the system is instituted have received a net transfer—they get $10 in benefits even though they never paid any taxes. Equally apparent is that if the system were ever eliminated, members of the last generation to pay taxes before the program ended would face an offsetting burden equivalent to the initial transfer—they would pay $10 in taxes but receive no benefits.

Perhaps surprisingly, generations following the first one face the same total burden even if the system continues indefinitely—the burden is simply distributed among all following generations. For the $10 paid in while working, a retiree gets just $10 back, resulting in a long-run rate of return of zero (the rate of growth of the tax base in this example). However, if that $10 had been saved rather than paid out in taxes, it could have earned interest. If the system continues unchanged, every future generation will lose the potential interest earnings on $10. An endless stream of interest payments on $10 is, by definition, worth $10 today—exactly the net transfer to the initial generation.[9]

Of course, in a public pension system, benefits are set by legislation, and so the transfer, and therefore the rate of return, to any particular generation can be set at the level desired. For example, in the simple system described above, the first generation to pay $10 in taxes could be paid $20 in benefits, implying a net gain of $10. However, that would require doubling the tax rate to raise $20 in taxes from the younger generation. That generation, in turn, would need even greater benefits to maintain a high rate of return. Such a policy could not maintain high rates of return indefinitely because taxes would eventually exceed income. Greater transfers to early generations merely increase the burden left for later generations to finance.

Similarly, the system could only temporarily finance high rates of return by issuing debt rather than levying taxes. Sooner or later, taxes would have to be raised to finance the interest on that debt.

For the Social Security system, the analysis is slightly more complicated than in the simple example because the payroll tax base grows over time as the size of the workforce and average earnings per worker both increase. Therefore, the system can pay benefits that represent more than a zero percent rate of return on a sustainable basis.

However, as long as the rate of growth of earnings is less than the interest rate, the average participant in the system still faces a reduced rate of return. Moreover, just as in the simple example, the total burden on future generations must equal the value of the net transfers to those who came before them.

9. If the $10 in taxes displaces $10 in saving for each generation, the economy as a whole also loses $10 times the interest rate because of reduced investment. However, the amount of saving displaced by pension contributions is uncertain—and beyond the scope of this brief.

Table 2.

Transfers to and from Participants in a Simple Funded Pension System

	Period				
Generation	1	2	3	4	5
1	0	0			
2		Contribution of $10	Benefit of $10 plus interest		
3			Contribution of $10	Benefit of $10 plus interest	
4				Contribution of $10	Benefit of $10 plus interest

Source: Congressional Budget Office.

Note: In this example, the pension system is instituted in period 2. The table collapses the life cycle of each generation into two periods, the first spent working and the second spent in retirement. The life cycle of each generation is read across each row of the table; for example, generation 1 is working in period 1 and retired in period 2.

Moving a System from a Pay-As-You-Go to a Funded Basis

Some policymakers have proposed shifting Social Security from its current largely pay-as-you-go financing to a partially funded basis. The contrast between a pure pay-as-you-go and a fully funded system, as well as the general effects of shifting from one to the other, can be analyzed in the context of the simple system described above.

In creating a funded system, mandatory contributions of 10 percent of earnings could be invested in assets to finance future retirement rather than immediately paid out in benefits (see Table 2). The generation that is retired when this program begins does not receive benefits. But in the next period, the new generation of retirees gets back its $10 contribution plus whatever interest the assets earned—there is no burden in the form of a reduced rate of return.

However, a pay-as-you-go retirement system such as Social Security cannot move to a funded basis—for example, to a system of private retirement accounts—without putting an extra burden on some generation or generations. To move to a funded system in one generation, either workers have to pay double, some generation must receive no benefits, or some balance of increased payments and reduced benefits must occur. In a simple example (shown in Table 3), workers could pay both $10 to current retirees and $10 into their own account as the system moves to a funded basis. A more gradual transition could spread the burden over more generations, but the total burden would be the same. In other words, to raise the rate of return for future generations by moving to a funded system, some generations must receive rates of return even lower than they would have gotten under the pay-as-you-go system.

Table 3.

Transfers to and from Participants as a Simple Pension System Shifts from a Pay-As-You-Go Basis to a Funded Basis

	Period				
Generation	1	2	3	4	5
1	0	Benefit of $10			
2		Contribution of $10	Benefit of $10		
3			Contribution of $20	Benefit of $10 plus interest	
4				Contribution of $10	Benefit of $10 plus interest

Source: Congressional Budget Office.

Note: In this example, the pension system is instituted in period 2, and it shifts from a pay-as-you-go basis to a funded basis in period 3. The table collapses the life cycle of each generation into two periods, the first spent working and the second spent in retirement. The life cycle of each generation is read across each row of the table; for example, generation 1 is working in period 1 and retired in period 2.

Related CBO Publications: *The Outlook for Social Security* (June 2004); *Acquiring Financial Assets to Fund Future Entitlements,* Long-Range Fiscal Policy Brief No. 8 (June 16, 2003); *Social Security: A Primer* (September 2001); and Randall P. Mariger, *Social Security Privatization: What Are the Issues?* Technical Paper 1999-8 (August 1999).

This policy brief was prepared by Ben Page. It and other publications by CBO are available at the agency's Web site (www.cbo.gov).